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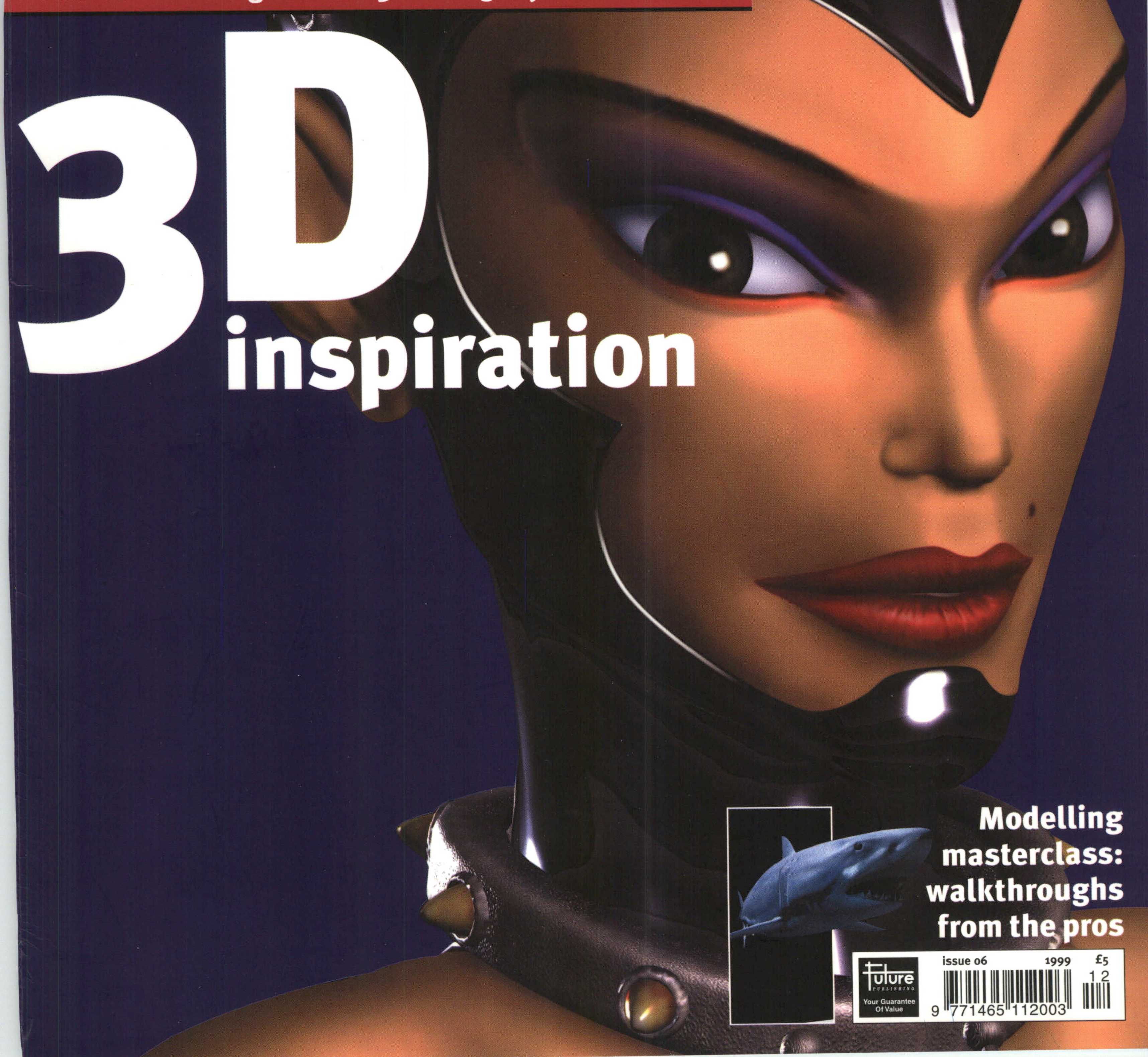

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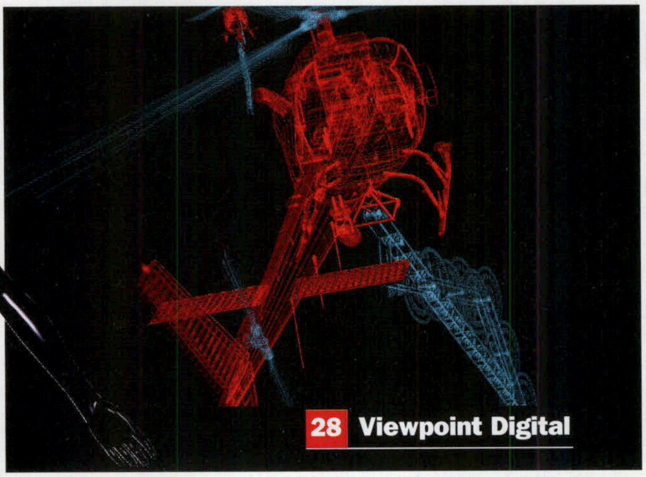
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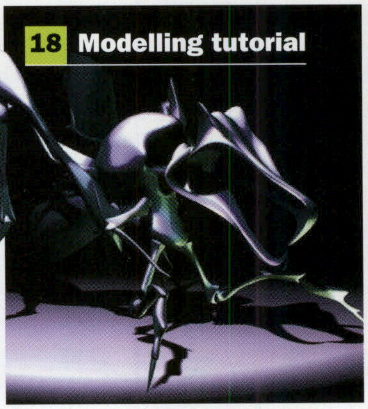
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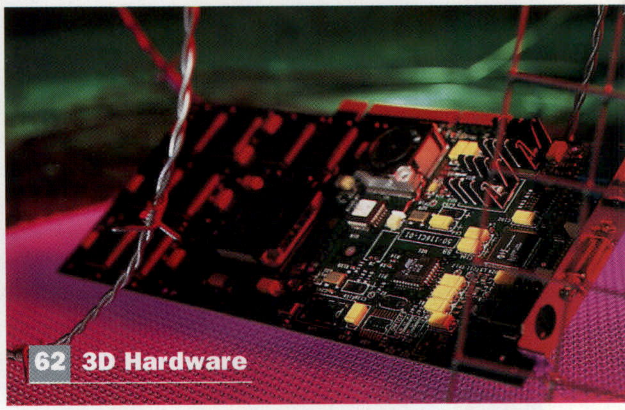
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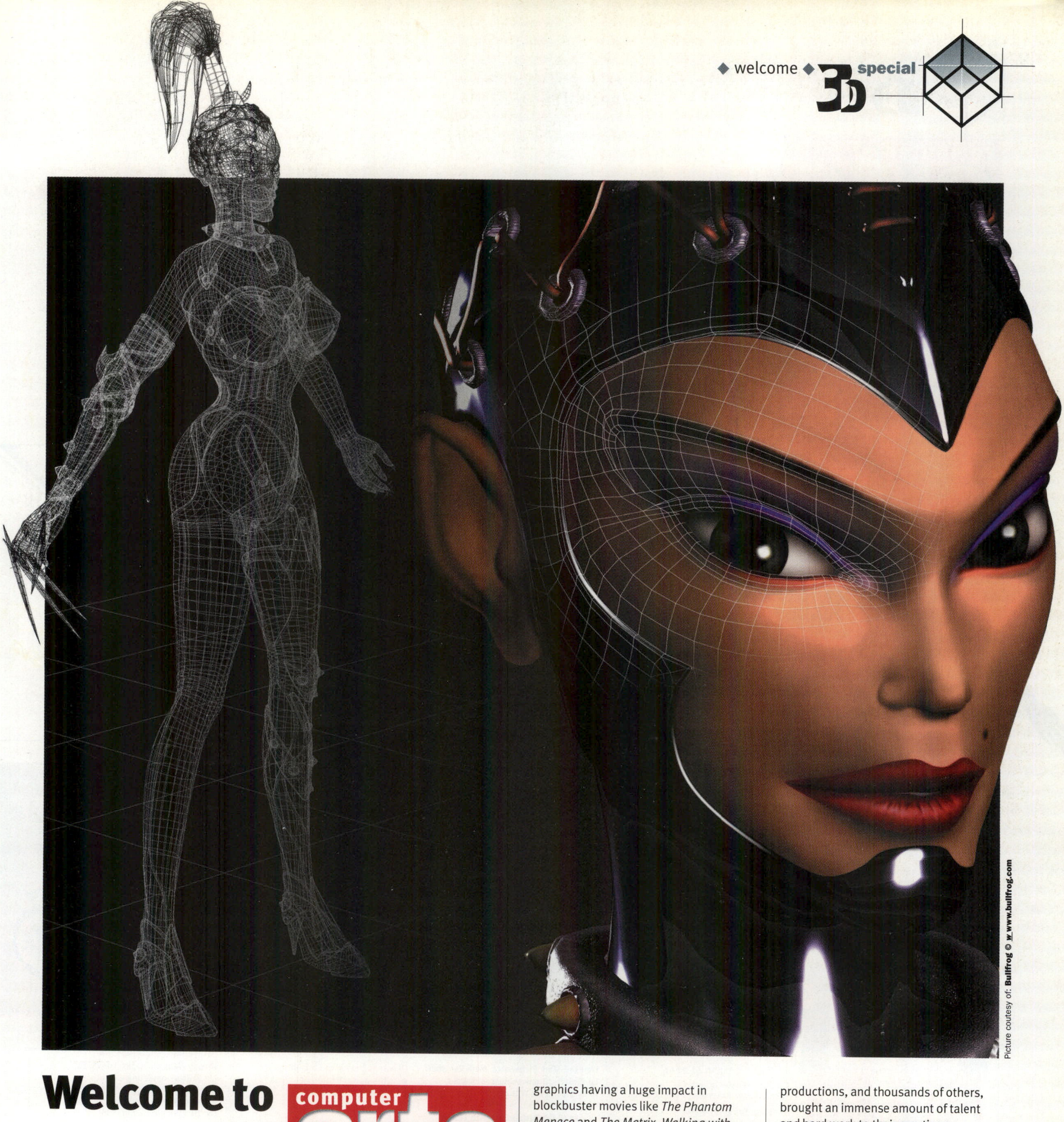

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Welcome to computer arts special

The definitive guide to 3D imagery • Mac & PC

There's a great feeling of excitement in the digital art world at the moment. Over 1999 we've seen computer graphics having a huge impact in blockbuster movies like *The Phantom Menace* and *The Matrix*. *Walking with Dinosaurs* proved a huge hit on television, while in the games arena cyber-babes like Bullfrog's Dark Mistress (our covergirl and the star of *Dungeon Keeper 2*) and Lara Croft have become media personalities.

But let's not take for granted the fact that the people behind these productions, and thousands of others, brought an immense amount of talent and hard work to their creations.

Here in our latest 3D special, our aim is to inspire you, not only by bringing you tutorials and tips to improve your 3D skills, but by talking to some of the top creatives in the graphics industry. No matter what software or system you're using, we're sure there's something in here for you... ca>s

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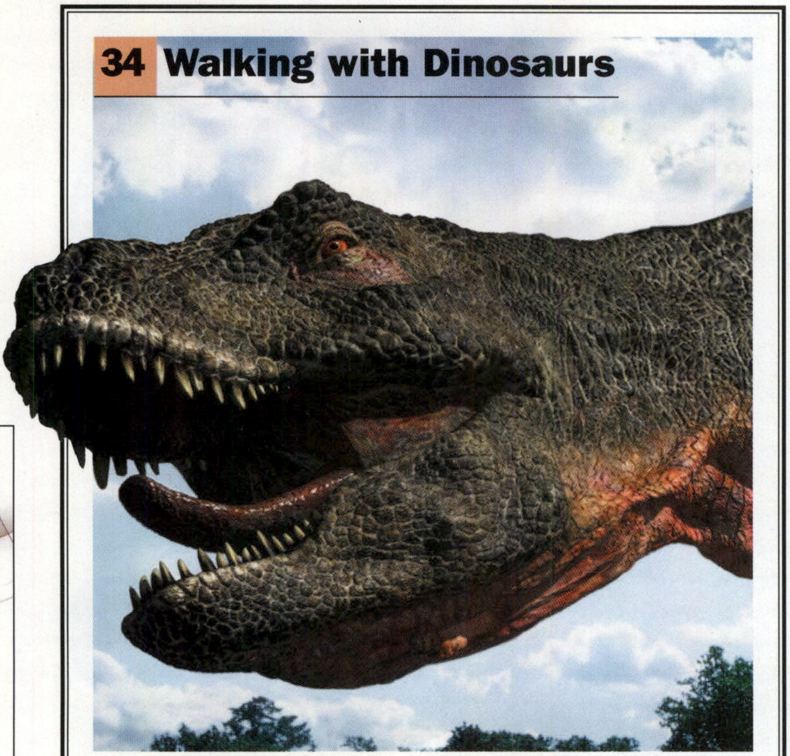

We go behind the scenes at Framestore to discover the animation techniques that brought dinosaurs back to life for the BBC series.

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Meet the up and coming 3D studio behind this Great White, then find out how to model the shark yourself with our expert tutorial. You can see the complete animation on our CD.

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On the *Computer Arts 3D Special* CD:

Full software: *trueSpace 3/SE* (PC only)

Free stuff: 10 DXF meshes from Viewpoint Digital; 15 tileable textures from Picture Garden (dual)

Nine software demos: *Amapi 3D 5*, *Bryce 4*, *Canoma*, *Cinema 4D Go*, *Cinema 4D SE*, *Cinema 4D XL 5*, *form•Z* (dual); *solidThinking 3.5*, *trueSpace 4.2* (PC only)

Showreels: *Shark Attack* by Magic Pictures; *Bingo* – a Maya showreel; *RealTime* – architectural visualisation

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3D 2000

WITH THE MILLENNIUM UPON US, WE GAZE INTO THE FUTURE AND SPOT THE TRENDS OF THE YEAR AHEAD

Will the booming games industry promise more work for 3D artists in 2000?

Though the world may be busying itself with the onset of the new millennium, the 3D graphics industry might just be in a mood to kick back and cruise. After all, the world of digital imaging and animation has had '21st Century' or 'space age' technology for the past three or four years now... well, according to some commentators, anyway.

Yet it's rash to assume that the year 2000 won't be exciting. The entertainment industry is bound to build on the successes of 1999 with bigger and more ambitious projects in the year ahead. Last year some of the most important films were dominated by special 3D effects. In fact, *Star Wars Episode I: The Phantom Menace* was probably noted more for the advanced methods ILM used on the effects than for its plot or characters. *The Matrix* wowed us with excellent, effects-enhanced action and *What Dreams May Come* demonstrated just how weird and colourful CG animation can be, despite its heaped helpings of sentimentality.

Coming attractions

In the coming year, and into 2001, we can expect follow-on flicks to come in thick and fast as directors and producers haggle with effects houses, hoping that now the techniques have been developed, the effects will be cheaper. However, we can already look ahead to several films with a cutting edge all their own. Top of the list is *Toy*

Jim Henson's Creature Shop's Toyota Golfish idents were often more intriguing than the ITV films Toyota sponsored.

***Toy Story 2* from Pixar and Disney is headed for the world's cinemas in 2000, with Buzz Lightyear leading the charge of the CG heroes into the new millennium.**

Story 2 from Pixar and Disney. Like *Toy Story* and *A Bug's Life* before it, *Toy Story 2* will continue in the 3D cartoon tradition rather than trying to marry CG wonders with real-world shots.

Not that the two need to be kept separate. Cinesite has been hard at work on an interpretation of *Animal Farm*, replete with talking animals. In a similar vein, another to watch for is *Stuart Little* by Sony Pictures Imageworks, with an extremely twee CG mouse as its main character. Far scarier will be *Pitch Black*, an other-worldly thriller featuring horrible monsters which studio Universal is keeping under wraps until the film's release in January.

Effects in *Animal Farm*, *Stuart Little* and *Pitch Black* were created with *Maya* and appeared as demonstrations at the Digital Media World show held in November at Wembley Conference Centre. Sony and Alias|Wavefront revealed how *Stuart Little* was created by a team of 30 animators. To get consistent animations, a customised and specially restrained model of the mouse was generated for the animators so that workflow on the film could be maintained with the director confident that each artist couldn't put their own spin on how Stuart should move.

Predominantly a hardware and software show, concepts like workflow cropped up time and again at Digital Media World, with creativity sometimes taking a backseat, unfortunately. Over the next few years, it seems we can expect to see the 3D software world align itself more closely with that of digital video. Typifying this trend more than anything is NewTek's VideoToaster NT hardware/software bundle. On top of its video editing, compositing and compression abilities, the package comes with Lightwave VT for generating 3D effects within the same suite for £2200.

> *"Over the next few years, it seems we can expect the 3D software world to align itself more closely with that of digital video. Typifying this trend more than anything is the VideoToaster bundle from NewTek..."*

Action stations

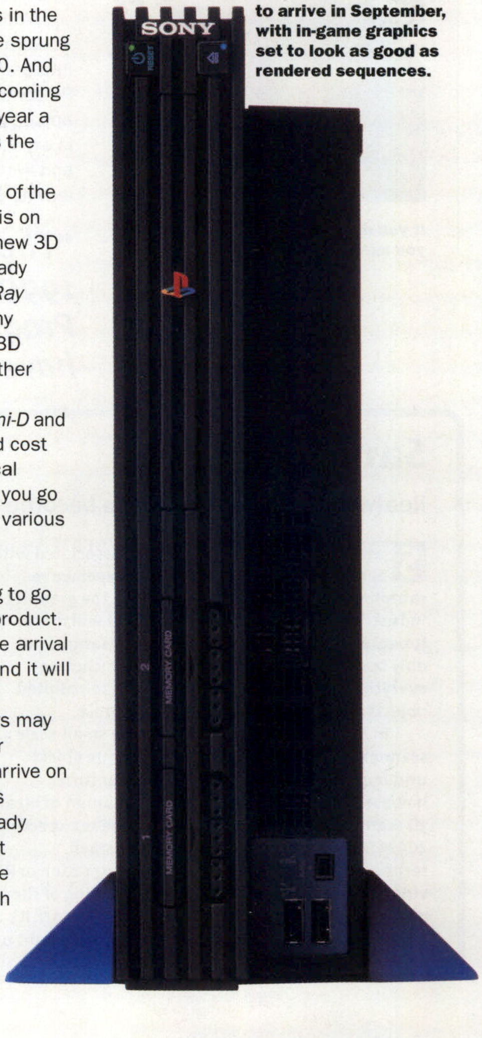
Avid's forthcoming version of *Softimage|3D*, codenamed *Sumatra Project*, brings a new non-linear animation authoring and editing feature which uses similar paradigms to video editing systems. For instance, animators will be able to make kung fu characters segue between running, kicking motions and punching motions. *Sumatra* will come up against updated versions of all the main 3D programs in 2000, including *Lightwave 6* and *Maya 2.5*, and you can read more about these apps and more in our software section starting on page 74.

Version 3 of *3D Studio MAX* continues to enjoy huge popularity, and publisher Discreet is moving things forward incrementally. *MAX* is now being linked to *frost**, the company's virtual set technology, while on the rendering side, new plug-ins are arriving, enabling users to take advantage of software like *Mental Rays* (by Mental Images) and *Renderman* (from Pixar). Discreet is being tight-lipped about the likely timing of a *3D Studio MAX* upgrade but if competition is strong from the other leaders in the field, a new one will probably be sprung on us at some time during 2000. And let's not overlook other up-and-coming competitors. Could this be the year a *Houdini* or *solidThinking* breaks the hold of the big four?

At the more affordable end of the software scale, Metacreations is on the verge of releasing a brand new 3D application called *Carrara*. Already successful with *Bryce*, *Poser*, *Ray Dream* and *Infini-D*, the company claims Carrara is the only new 3D application to be developed (rather than upgraded) for a few years. Eventually taking over from *Infini-D* and *Ray Dream*, the program should cost under £300 and will use a typical Metacreations interface where you go to different 'rooms' to perform various functions as you produce your masterpiece. If the quality and popularity of *Bryce* are anything to go by, it should be an interesting product.

Prepare to meet Sony Pictures Imageworks' *Stuart Little* in 2000 – he's a CG mouse with attitude. Geena Davis and Hugh Laurie play his real-world 'parents'.

March 2000 should see the arrival of the PlayStation 2 in Japan, and it will appear in Europe and the US in September. Some CG animators may be rubbing their hands together expecting a lot of new work to arrive on their doorsteps from the games industry. But warnings are already going out: don't expect the best developers and publishers to be looking to pack their games with CG intros and cut-scenes. PlayStation 2's in-game graphics are looking nearly ⇒



PlayStation 2 is poised to arrive in September, with in-game graphics set to look as good as rendered sequences.

3D Retro?

This is the second 3D Special to be produced by *Computer Arts*. If you missed our first one, call 01458 271 108 to order your copy for £6 – while stocks last. Inside you'll find heaps of information to improve your 3D skills including:

- **200 tips**
- **Basic Modelling**
- **Displacement Modelling**
- **Boolean Techniques**
- **Spline Modelling**
- **Deformations**
- **Surface Textures**
- **Lighting Techniques**
- **Procedural Shaders**
- **Morphing**
- **Modelling Old Trafford**

If you didn't buy our first 3D Special, you missed a bundle of 3D technique.

as good as rendered sequences and many game designers will seek to keep as much of the action interactive and in real-time as possible. While we're on the subject of PlayStation, *Tomb Raider IV: The Last Revelation* is set to be the biggest Lara Croft game yet, and might even prove the biggest game ever.

Playing the game

While the arrival of PlayStation 2, along with Nintendo's Dolphin console, may not in themselves mean more work for CG artists, the general growth in the games industry could still have the desired effect. Similarly, whereas the advertising industry seemed to wake up to computer graphics in 1999, in 2000 we expect a real boom. TV programmes like *Walking with Dinosaurs* have really brought home to agencies and directors what's possible in photo-real 3D. They may have been scared off by ILM-level quotes of around $10,000 a second, but these days both pricing and demand for the service are looking far more realistic.

With SGi moving out of the NT workstation business, it will be interesting to see which mainstream PC companies end up having the most appeal for the smaller 3D houses. SGi is expected to concentrate on its high end systems for Unix and Linux, leaving Compaq, Intergraph and the others to produce NT workstations for creatives. Even here we could be in for a shake-up with the arrival of the new GeForce chipset by nVIDIA. At just £200 and with lighting and geometry transform and comprehensive OpenGL support, some high end graphics card suppliers are sensing fear.

If serious graphics cards reach prices like that, and if software like *Carrara* lives up to its early promise, it seems 2000 could see 3D creativity broadening further in its accessibility. Whether this actually converts to more talent and better images on our screens, we'll just have to wait and see... Happy New Millennium! ca▸s

> *"The advertising industry woke up to CG in 1999 and we expect a real boom in 2000. Programmes like Walking with Dinosaurs have really brought home what's possible..."*

LEAF 1999 The London Effects & Animation Festival

The 1999 London Effects & Animation Festival ran alongside the Digital Media World show, with a series of seminars from top creative studios in the 3D world, including ILM, Sony Picture Imageworks, Cinesite and Framestore. The highlight of the event, however, was its awards ceremony. Looking at the winners we can see several who are likely to be top talents in 1999. Here they are – just imagine you can hear a drumroll about now...

- **Commercial Animation:** *Megalomanica* by AKA Pizazz
- **Student work:** *Hollow* by Jason Shulman
- **Simulation:** *The Millennium Bug* by Benjamin Smith and Stormfront
- **Commercial Live Animation:** *Lincon 'Surprising Journey'* by The Mill
- **Education & Training:** *Walking with Dinosaurs* by Framestore
- **Music Video:** Björk's *All is Love* by Glassworks
- **Short Films:** *Bunny* by Blue Sky Studios
- **Titles, Idents & Stings:** *Toyota Goldfish* by Jim Henson's Creature Shop
- **Feature Films:** *Star Wars Episode 1* by ILM

The charming *Bunny* by Blue Sky Studios won best short film at the London Effects & Animation Festival.

Sample this!

Realworld sampling is set to become an increasing trend in 2000

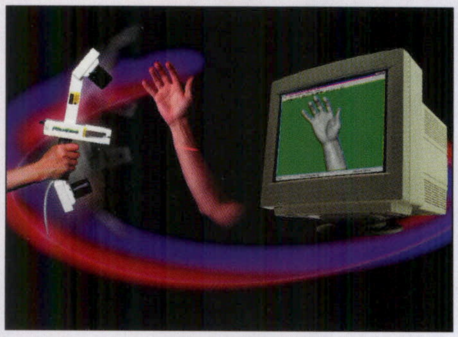
Sampling is something normally associated with the modern music industry. However we're sampling the real world all the time in the graphics industry. In 2000, however, the concept will move forward and it will become possible to sample not only textures, but entire shapes in 3D including everything from desktop knick-knacks to sculpted objects and on to buildings or even people.

In June 1999 we tested the Picza, a small-scale 3D scanner enabling you to turn any opaque object under 400g into a 3D object. As the year turns, however, companies are offering all manner of bizarre 3D scanning equipment. On the way we're expecting ZCAM from 3DVSystems. It's based on Israeli technology and can capture depth information or RGB video and could make bluescreening a thing of the past. Another possibility is Polhemus' FastSCAN. It's a handheld 3D laser scanner that lets you walk right up to something and turn it into a 3D object virtually on the spot. Unfortunately, it costs $32,000. Or, you could just ring up SoHoCyberscan and ask them to scan your object for you... at a price.

An easier way might just to be take some photos of the object, building or scene you want to turn into 3D, scan them in, and use Metacreations' *Canoma* software. Version 2 is planned for 2000, with support for curved edges (splines). Furthermore you'll be able to detach objects from their setting and move them around more easily. It's hush-hush at the moment, but it could be the perfect tool for turning real world places into scenes for CG animations or game levels.

Information

Picza is available from Patrick Thorn & Co on **t** *01784 466 474, for FastSCAN see* **w** *www.polhemus.com, for SoHoCyberscan call* **t** *020 7344 8917. More on Canoma is available at* **w** *www.metacreations.com/uk*



The handheld FastSCAN will enable you to run about scanning everyday objects for use in your 3D applications. You can even scan people.

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It is a workhorse, with stability that is legendary (as stable as a healthy elephant, one reviewer said), a super-fast, high quality render engine and a wealth of features for 3D modelling, animation and rendering.

For more than three years CINEMA 4D has consistently won award after award throughout the world. It is constantly being developed and improved; the latest addition being CINEMA 4D NET, which enables distributed rendering over TCP/IP networks.

So, if you're sick of being tossed from one package to another, why not contact us to learn what CINEMA 4D can do for you? A complete demonstration CD is available and you can find out more from www.cinema4d.com or by calling or emailing us:

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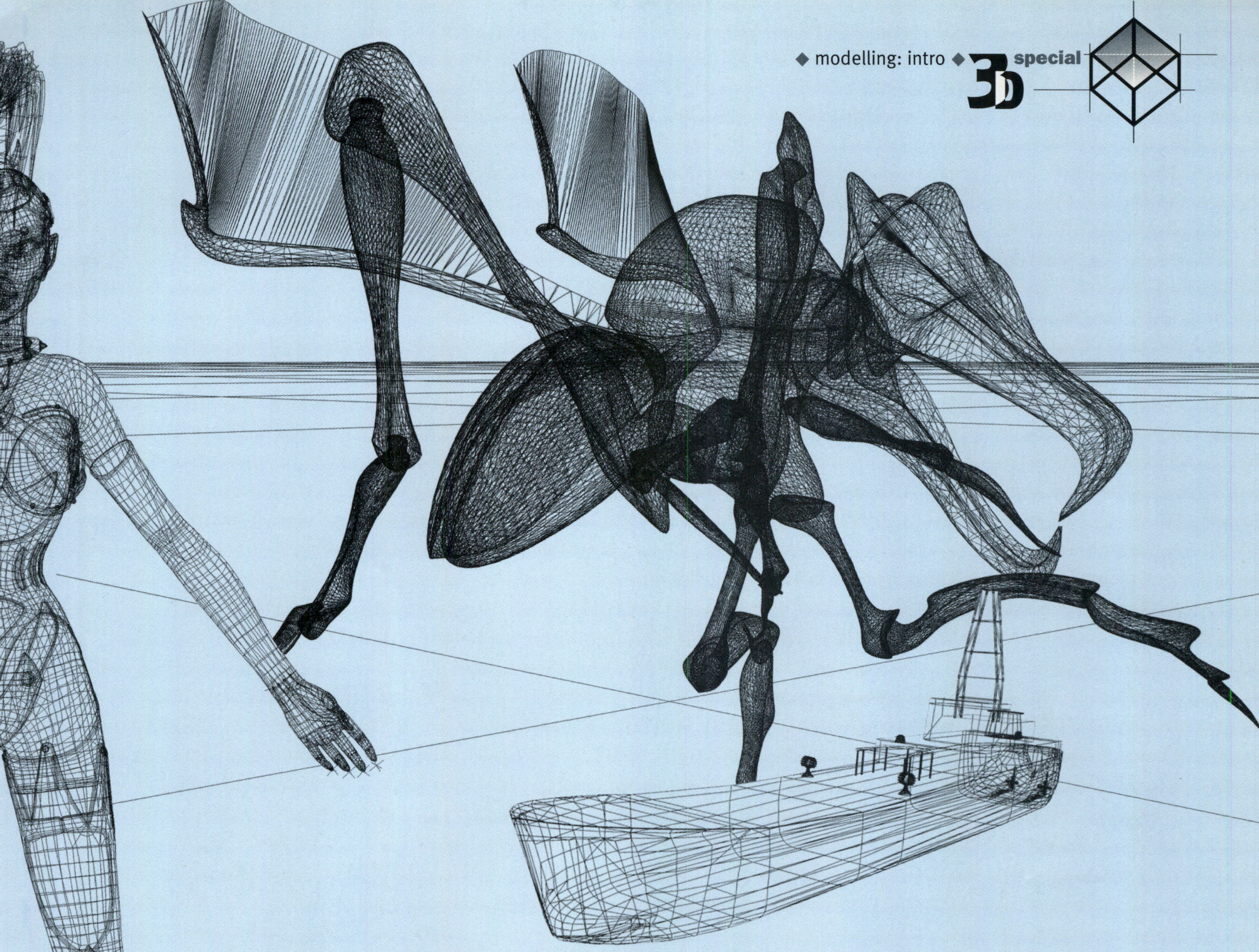


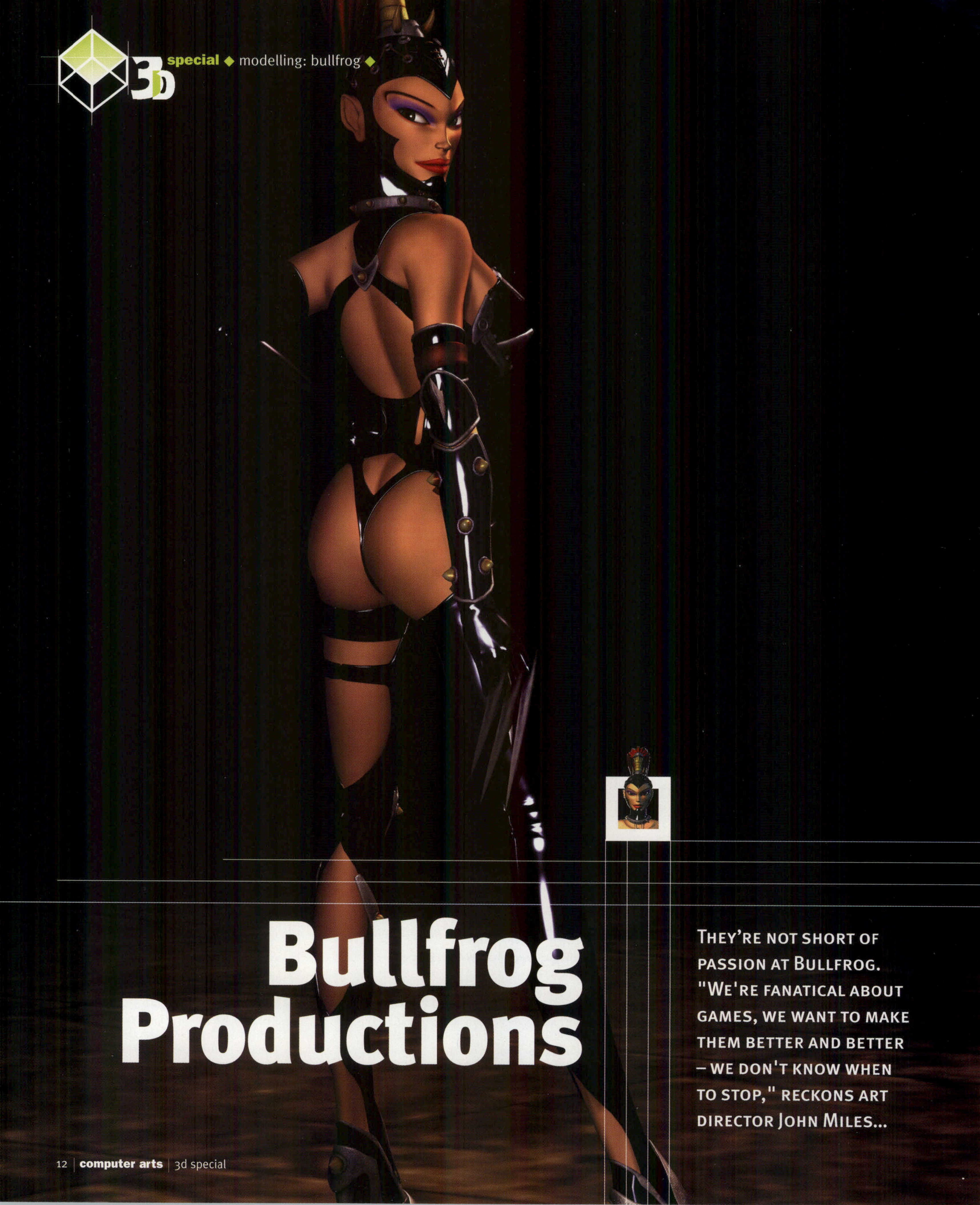
modelling intro

Computer models are a lot more than just pretty forms, as you'll discover...

There are all kinds of skills you can learn in order to become a better modeller. Some are tempted to practise that strange sounding technique called Boolean operations. Or you might be tempted to practise spline design or work on your deformations. However, one of the main requests we've had since our first 3D Special was to do more on character modelling.

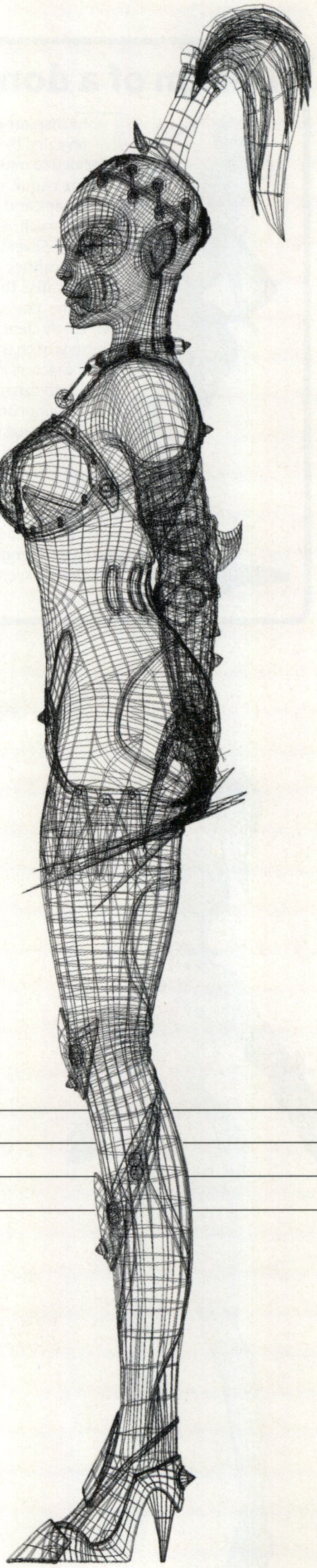
It's pretty clear why people want to learn about creating characters. Be they people, animals or space monsters, good 3D characters are crucial at the sexier end of the computer graphics industry – entertainment. And as you know, a well modelled 3D character can become a superstar. Just look at Lara Croft...

Creating modelling characters is about more than just putting human or animal forms into your 3D world. They need to be designed with imagination, and often a lot of restraint. To get characters that look and feel as though they truly possess the vital quality of 'personality' is a tricky job. That's something we'll find out as we visit Bullfrog and discover how they created our covergirl, who also stars in the game *Dungeon Keeper 2*. Then we'll meet the team behind one of Britain's hottest new 3D animation studios, with an excellent tutorial showing you how to model their breathtaking shark. And we'll also visit Viewpoint Digital and discover how they modelled the vehicles featured in the latest James Bond blockbuster...



Bullfrog Productions

THEY'RE NOT SHORT OF PASSION AT BULLFROG. "WE'RE FANATICAL ABOUT GAMES, WE WANT TO MAKE THEM BETTER AND BETTER – WE DON'T KNOW WHEN TO STOP," RECKONS ART DIRECTOR JOHN MILES...



"We're trying to be more organised, keeping that creative element, and having dedicated concept periods doing new games, with very small teams seeing what's cool..."

Bullfrog's greatest hits

From *Populous* to *Theme Park World*, a decade of innovation has seen Bullfrog produce a string of best-sellers and receive Tony Blair's seal of approval

Bullfrog was founded in 1987 by Les Edgar and Peter Molyneux and a small band of games fanatics, with the aim of producing original games that offered more of a cerebral challenge than the arcade titles then dominating the charts.

Its first release, *Populous*, is credited with creating a whole new genre of computer game – the 'god game'. The idea was unheard of at the time, and *Populous* was rejected by every major software publisher except one – Electronic Arts, the first seeds of a relationship that was sealed when Bullfrog merged with EA in January 1995.

In 1997, Bullfrog was hailed by Tony Blair as an example of the British spirit of innovation and design: "These people are ambassadors for new Britain. They embody strong British characteristics as valuable to us today as they have ever been: know how, creativity, risk-taking, and most of all, originality."

- 1989 Populous
- 1990 Powermonger, Flood
- 1991 Powermonger: World War One Edition, Populous 2: Trials of the Olympian Gods
- 1993 Syndicate
- 1994 Theme Park, Magic Carpet, Syndicate Plus
- 1996 Theme Hospital, Syndicate Wars, Magic Carpet 2
- 1997 Dungeon Keeper
- 1998 Dungeon Keeper: Deeper Dungeons, Populous: The Beginning
- 1999 Dungeon Keeper 2, Theme Park World

It's no surprise that modern kids grow up wanting to be games designers. When you're not fiendishly constructing gravity-defying three-dimensional rollercoasters, you're frolicking with the leather-clad dominatrix on our cover.

There's more to 3D games design than that, of course, but it's that kind of passion for games that has made Bullfrog the country's leading games developer, and the place those kids all want to work.

Since *Populous* was unleashed on the planet in 1989, the Guildford-based studio has turned out a string of blockbusters, and ex-employees have set up a mini games design industry in the town. And while founding father Peter Molyneux may have departed, that hasn't dented the firm's confidence, with both *Dungeon Keeper 2* and *Theme Park World* destined to appear in a lot of stockings this Christmas.

"I think Bullfrog is such a strong company because we're fanatical about games," says art director John Miles. "People want to better and better their game, so much so that sometimes we don't know when to finish it and put it in a box."

Team spirit

Since joining Bullfrog two years ago, John has worked on both *Populous: The Beginning* and *Dungeon Keeper 2*, and overseen a change in the way the

⇨

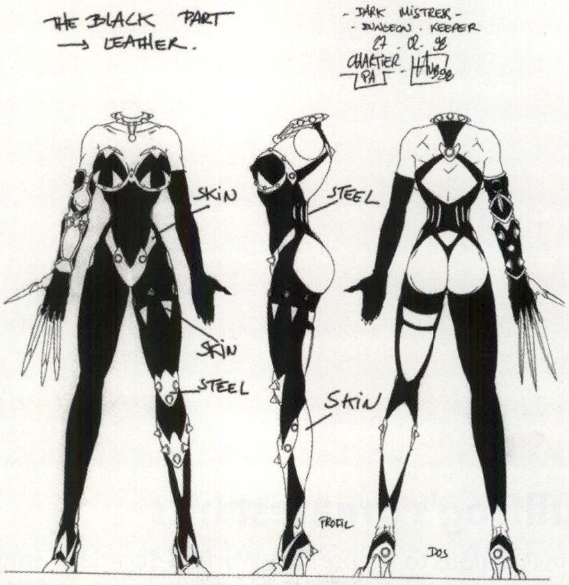
Design of a dominatrix: Obey your Mistress...

The inspiration behind our cover star, the Dungeon Mistress, was revealed by character artist Darren Pattenden: "Since *DK1* we'd decided to make her a more prominent figure and go for something more risqué. I was thinking about Catwoman from the Batman movies, and a Japanese artist called Hajime Sorayama, who likes to airbrush very realistic women in leather and not a lot else..."

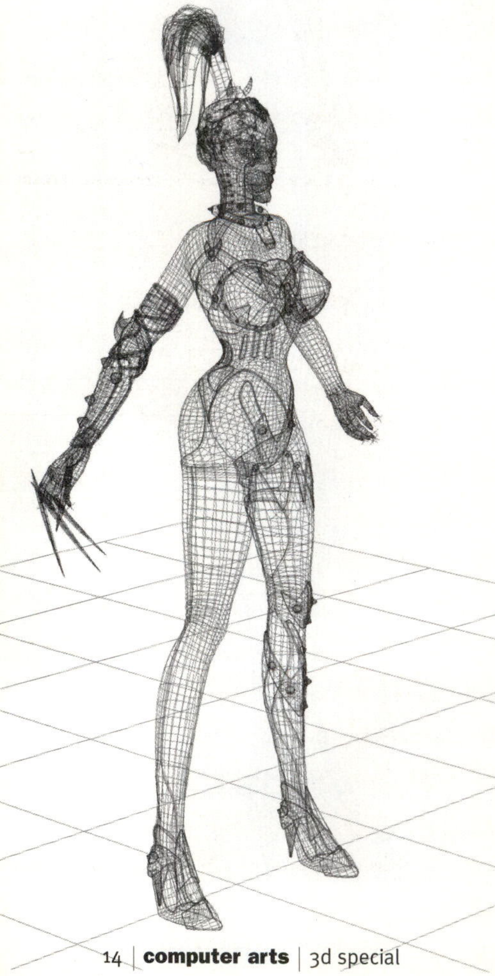
Several restrictions were imposed on the design by the practicalities of gameplay. For instance, the Mistress couldn't be too spiky because the designers didn't have enough polygons to translate that into the game. She was streamlined several times, so she could be convincingly created out of 200-300 polygons in the game. "The game has hundreds of characters running around," says Darren, "so we had to make the characters low-poly so you didn't need a mainframe the size of a house to run it on."

Dungeon Keeper 2 as a whole involved an enormous amount of work, not least because of the game's incredible depth, says lead animator Jason Smith: "There are animations you'll only see on specific levels, like the casino mode, which only 20-30 per cent of the people will ever see." It's this kind of touch that, although it involves a lot of work, means people will keep playing the game.

"That's the cool thing about Bullfrog, a lot of the games on the market have a flash 3D engine but not much of a game in there, but things like *Dungeon Keeper* are really involving," adds Jason.



> *"The first thing to do is come up with styles, collecting references from games, looking at films, magazines, building up storyboards..."*



studio's 50 artists tackle the creative process: "In the past, the teams working on a product got too big and unwieldy. We're trying to be more organised, keeping that creative element and having dedicated concept periods doing new games, and the teams are very small, three or four people, seeing what's cool."

It's at this point that 3D packages get put to one side, while traditional sketchpad and pen come into their own, as Jason Smith, lead animator on *DK2* explains: "The first thing is to come up with styles, collecting references from existing games, films, magazines, building up storyboards and style sheets."

In *DK2*, you play a bloodthirsty dungeon boss, doing battle with Horny The Horned Reaper. It's very dark, and the Mistress's look underwent a number of changes (see above) before a final design was settled on, at which point the hi-res image and FMV were produced by a French company, Animare, using *Softimage* on Silicon Graphics machines.

When the hi-res was complete, it was used as the basis for in-game texture maps for the Mistress, while work began on the other characters, which were animated using *Character Studio* in *3D Studio MAX*. The process involved motion capture, or as the team refer to it: "People in suits walking round being Horny".

There were practical reasons behind the choice of software. "There are other tools we'd rather have been using, but it's easier to get people who've been using *MAX* than higher end packages," says Jason.

Big dipper

Theme Park World enables you create, manage and ride your own personal Alton Towers. It presented a huge challenge, with the need to design not just one but four different game worlds – a task akin to designing four different games. The team also had to create a gang of cartoon-like little brats, but they couldn't be *too* distinctive.

"When we started we had a a geeky kid with NHS specs – he looked like a programmer," said animator John McCormack. "When you put him in the game, you kept seeing him all over the place, so I though, 'ah! that's a mistake!'

"So it was frustrating having to be less creative. And because there are thousands of sprites on the park, they all had to be the same size," he says.

Populous: The Beginning **is the latest incarnation of the game which sparked off Bullfrog's incredible success.**

Like *DK2*, the requirements of the gameplay affected the way the characters were created. One problem was getting *Softimage* models into *3D Studio MAX*, as a lot of John's models were used as sprites in the game. "They were hugely high-resolution," he says, "I was modelling in NURBS, when you transferred them you had literally hundreds of thousands of polygons for a tiny sprite."

Softimage was used, according to John, for its sheer simplicity: "It's user-friendly enough to design with; if you were using a more programmer-y package, you'd have to draw everything perfectly designed and then transfer it, but with *Softimage* you can have a rough sketch and it comes out in 3D as well."

Another headache was the feature which allows you to view your park from any angle and enjoy the rides first person. "You had to build everything from every angle, because a rollercoaster can go anywhere," says John. That meant no missing polygons or dodgy textures, while every imaginable facet of the park had to be drawn, because eventually someone will get to see them. There's simply no scope for cheating.

So what's the future for Bullfrog? John Miles remains tight-lipped on upcoming projects: "EA don't know a lot of the things we're working on. We are ⇒

> **"When we started Theme Park World it had a geeky kid who looked like a programmer – but you kept seeing him all over the place!"**

Modelling masterclass

Bullfrog's Graham Bell guides us through the creation of a 3D games character...

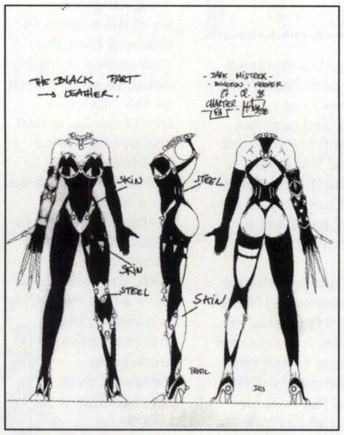
Pre-production is an integral part of any computer graphics project, and character design is no exception. If you're planning on creating a character, the first thing to do is decide how it's going to look. Whether it's a human, an animal or an alien, you need to envisage how your creation will turn out.

For *Dungeon Keeper 2*, a lot of concept and design work went into the FMV characters, well before any modelling was even started. It's good to gather together as much research and reference material as you can – photos, sketches, videos can help influence your character's look and style. Don't ignore things like clothing textures. In some cases producing scaled clay models can be a help.

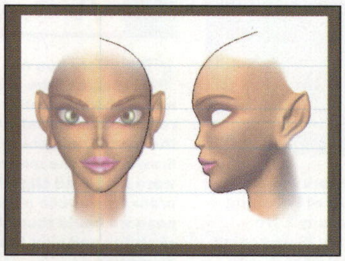
All this can seem too time consuming, especially if you're itching to jump straight in and start modelling. But if you were to start modelling your character, in your particular 3D package, don't be surprised if you encounter some problems. You might, for example, change your mind about how your character looks, or decide to change the size or shape of your model. This may require you to redo certain steps in your 3D package, or even to start again from scratch. It's a waste of valuable time, especially if you're working on a big long term project, such as the *Dungeon Keeper 2* FMV. The last thing you want is to make major changes when you're halfway through your production time.

That's why the design and concepting is crucial when creating characters. Several different looks for the Mistress and the other *DK2* characters were produced before the design was finalised. Once these designs were settled, the modellers and animators could start thinking about the 3D computer side, without the threat of major changes being made at a later date.

Then you need to think about how you're going to model your character. Should you use NURBS, patches or polygons? Will the character be animated? Is facial animation going to be needed? What 3D software will you be using? There are quite a number of packages on the market, all with their own advantages and disadvantages. So it's often down to your own preference, or what you have access to. For *Dungeon Keeper 2*, *Softimage* was used for the modelling, animation and rendering of the FMV sequences.

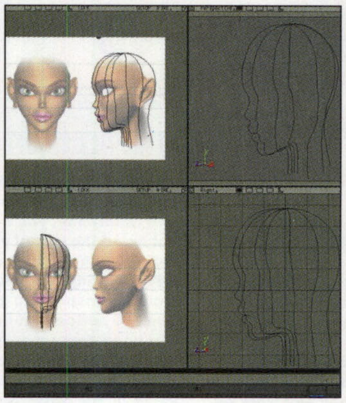


1 **Once you've concepted and designed your character, and are ready to start to work in 3D, it's a good idea to sketch out certain views of your character. Front and side schematic views like these can be loaded into your 3D package and used as a guide or template for your model.**

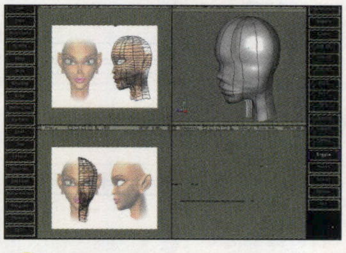


2 **Here, the concept art for a woman's head has been loaded into *Softimage*. This is going to be used as a guide for modelling the head of the mistress, be it in NURBS or polys.**

You can start to model a head by 'skinning' or 'lofting' a series of curves. Here, b-spline curves have been drawn along the side profile of the face and front view of the face. The most important curve here is the side profile following the forehead, nose, lips and chin, and it's important it's correct, as it can help determine many of the other features that make up the face. Good reference material is essential at this point.



3 **By duplicating and rotating the curves, then altering them, by moving the points but not deleting them, we can begin to produce a series of curves that reflect the contours of your face. Here, the absolute perfection of the curve is not really essential, but it should provide you with a good starting point, as further tweaking and altering will be required later on.**



4 **After 'skinning' or 'lofting' these curves, you will have produced a NURBS, patch or polygon object, hopefully resembling a head. As you can see, though not it's perfect, you can begin to see the basic form here, enabling you to start tweaking and properly defining your model. You may, after skinning, have some really obvious glitches in the geometry. This could be caused by one of the curves perhaps not being quite right. You should be able to undo the skinning action and go back and adjust the curve you think is wrong and re-skin. Of course you can apply this technique to parts of the character other than the head – the arms or legs, for example.**

Focus groups caused problems during the evolution of *Theme Park World*, thanks to the Japanese distaste for the animation tradition of only using four fingers, while a character sticking her tongue out was seen as a huge insult!

doing more work on *Dungeon Keeper* – Horny and Dungeon Mistress are big characters for us.

"We think having fun is important, we like to add our own humour – we're being forced from a market point of view. People are now comparing computer games to films and other big entertainment areas and everyone's aware they've got to make it look cool. With consoles, and the advent of PlayStation2 and Dolphin, because people think, oh they're on a TV screen, therefore it should look like a film."

What does Bullfrog look for when recruiting? "Good artists, good traditional art skills – can't emphasise that enough," says John Miles. "Drive and enthusiasm, and an interest in games. The first thing I want to see is a good traditional portfolio, so I want to see lots of sketches. I want to see 3D modelling stuff as well, or sculptors, photographers – I want to employ people from a variety of backgrounds. We've got professionally trained architects in this building.

"If somebody's a brilliant artist, I'm prepared to spend money and train them. It's easier to train a good artist, than to get someone who's used *MAX* or *Softimage* and make them a good artist." ca•s

Information

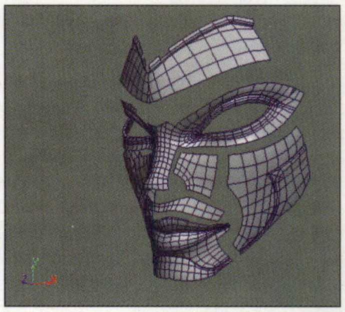
For more information about Bullfrog Productions, visit
W *www.bullfrog.com*

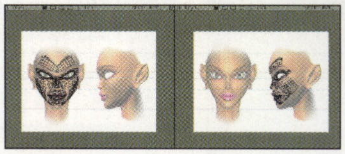
Modelling masterclass *continued*

Our Mistress is nearing climax...

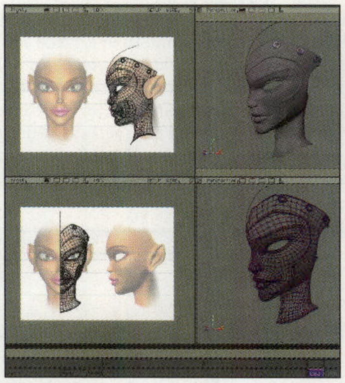
5 **When you're happy with your basic shape, you can either continue working in NURBS/ patches or convert the geometry to polygons. It can often make no difference which method you use, though you should have already decided before you reach this point.**

Modelling in NURBS and polys can often make no difference, as you are effectively 'sculpting' with whatever you do. You can even decide not to make use of curves to begin with, and start with just a basic primitive, such as a sphere or cube. Many people regard polygons as the best method to start off with, if you decide to use this approach.

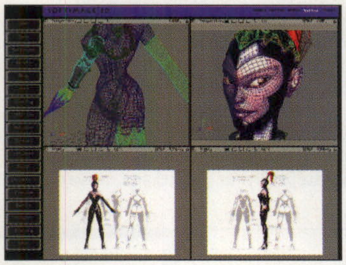




6 **Some packages can help you to take an even slightly different approach, especially if you are working in NURBS. By using curves again you can produce segments or 'patches' of geometry to make up your face, as in this picture. This can mean you work on certain elements such as eyes, nose, lips and ears separately. Then some packages will have features that can enable you to, in a way, 'glue' or 'stitch' these patches together, thus creating your head geometry. Which method you use can come down to personal preference and the nature of the project your character is being modelled for.**



7 **After the initial work and no doubt several hours of tweaking and redefining, you hopefully have achieved the model you've been hoping for. You can see how important it is to have drawings and sketches to work from, to ensure you get the right shape. You will notice that only half of the face has been generated in this picture and some of the others. It's safe to assume that one side of the face and body is the same as the other. So instead of having to go to great lengths modelling both sides the same, you can model one side, duplicate it and then flip it to mirror it, thus creating one head or body. You should then a left side and a right side. You can then attach the two together if you wish. This was done with the mistress, but because of her outfit, extra work was required on her legs and arms to make them different.**



8 **Here you can see the finished result of the mistress model, after hours of work. Notice how again good reference material was used, so that the model resembles the final concept drawings of the mistress. The arms were modelled slightly further apart to order to produce a reset pose. With this pose we could then start to insert a skeleton and skin the character for animation.**

The Mistress is not one continous model, but made up of several different parts linked and parented together. If you notice on her left side, her arm and thigh are a different colour to the rest of the main body. The mistress' outfit required her left arm and leg to look different. For modelling and texturing purposes, these elements were produced seperately and linked/ parented to the rest of the model without actually physically joining the two together. You can also see other parts of the model that are also different colours. This means that they are separate elements that have been linked.

9 **Once the model was complete it was ready to be animated. However, it was often the case that before a model was even finished, animators have already started skeleton, weighting and animation tests for this and the other characters. A highly detailed model such as the Mistress would cause speed and performance problems for an animator to work on. So a lower resolution model is produced for the animator to work with, then at a later date when rendering is needed, the low resolution model can swapped over for the high one. This technique is used a lot when it comes to large projects such as films and game FMVs.**

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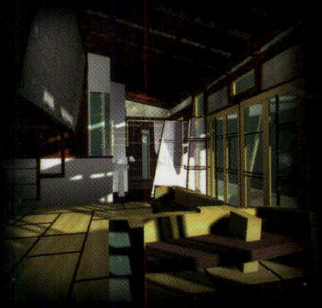

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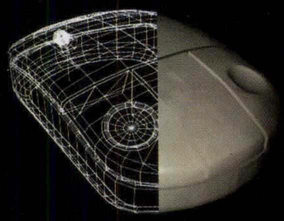

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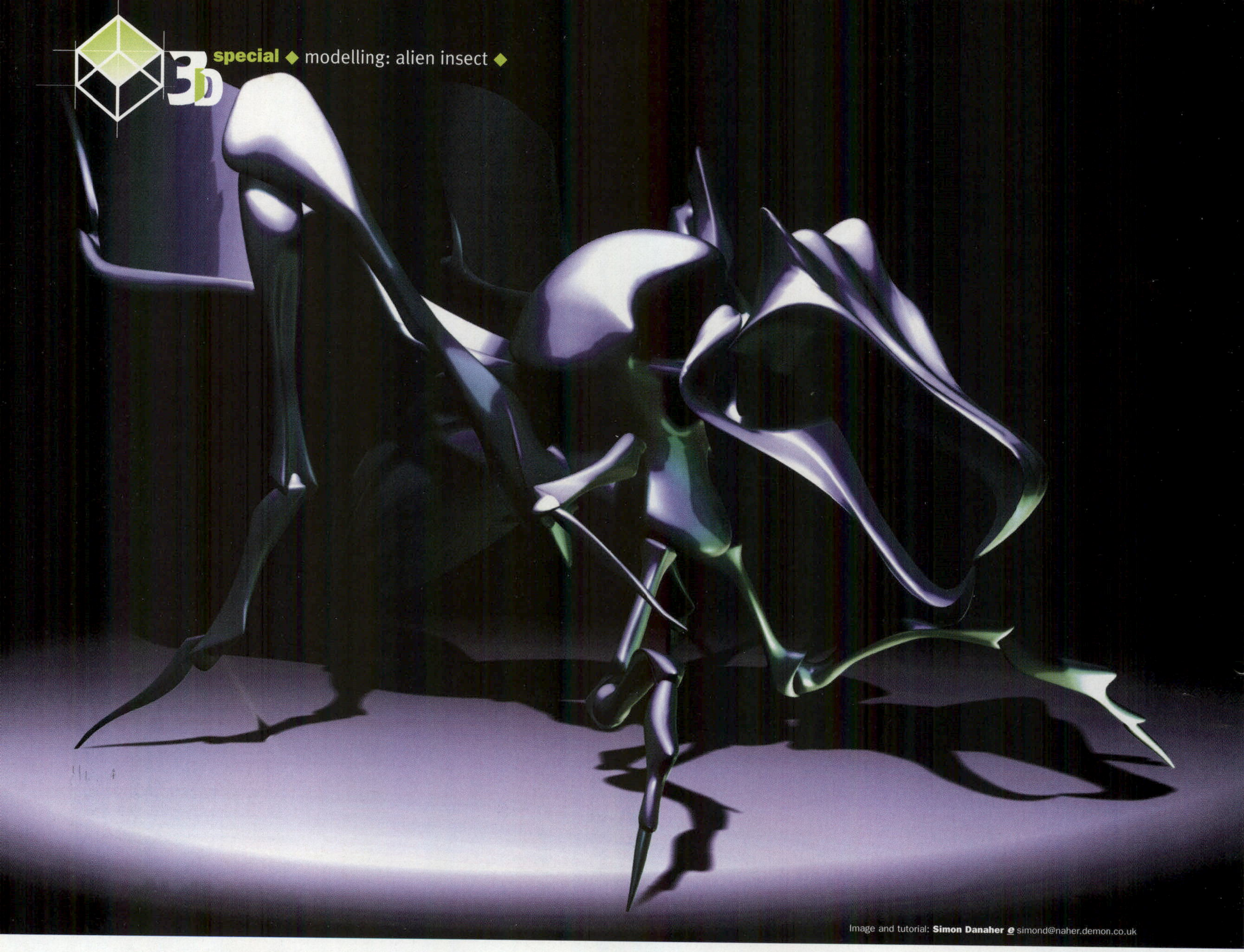


Image and tutorial: **Simon Danaher** *e* simond@naher.demon.co.uk

alien insect

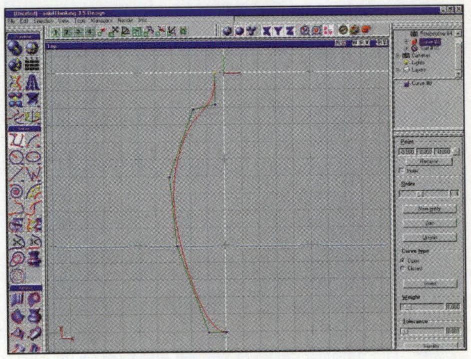
Learn how to model this insectoid alien using the solidThinking 3.5 demo on our CD. Here's how to bring your bug to life...

Setting up realistic characters and monsters in your modelling program can be a tricky task. They need to look suitably realistic, and the smaller details in the creature need to convey something about its demeanour or character.

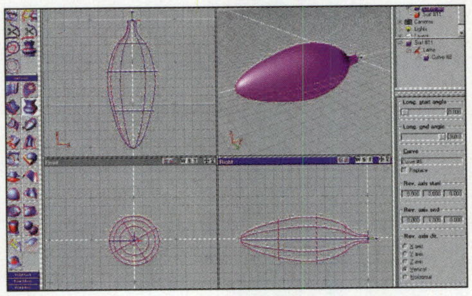
So here in the modelling section we decided to show you how to design a *Starship Troopers*-style arachnoid alien. The tutorial is written using the demo version of *solidThinking 3.5* which you'll find on our cover CD. Unfortunately the demo is PC only, though a Mac version of *solidThinking* is on the way. It's fully functional but save-disabled. However if you're having trouble with any of the steps we've also included finished models of the alien body parts on the CD for you to look at.

Stage One: Modelling the body

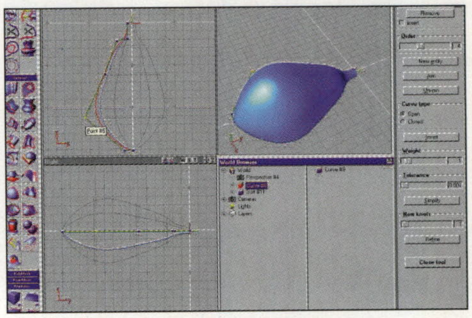
The first step is to create our alien's abdomen...



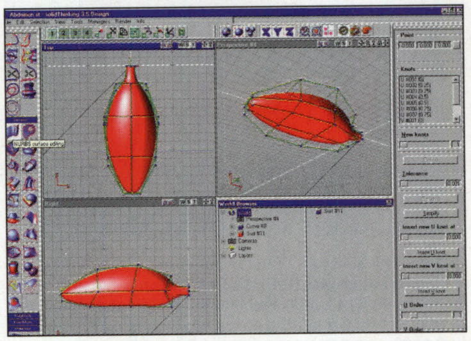
1 We'll start by drawing the Abdomen curve, so select the NURBS curve tool from the tool bar. You are prompted to define the axes origin for the curve, just hit return to accept the 0,0,0 default. Place 7 CVs, roughly as you see here in top view. Hit the space bar to end drawing.



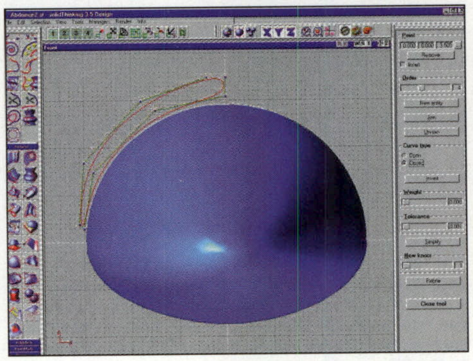
2 Note that you can expand any view by double clicking its title bar. Next, select the Lathe tool (from the surfaces tab of the tool bar). Follow the prompt and select the curve. Hit return twice to accept the start and end angle defaults (360 and 0) and then type Y and return to specify the y axis for the lathe. To change display mode you can click the W, S or T buttons at the top of each window. *solidThinking* supports Direct 3D and OpenGL.



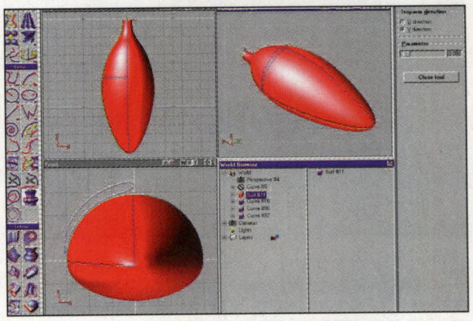
3 The lathed surface is displayed in purple, indicating it is part of a construction tree. This means that its shape remains dependent on the curve you drew. Select Managers>Browser to open the World Browser and select the curve in the list. Hit the space bar to toggle Object (to select and move etc) and Edit modes for the curve. If you drag its points, the Lathe's shape will also change.



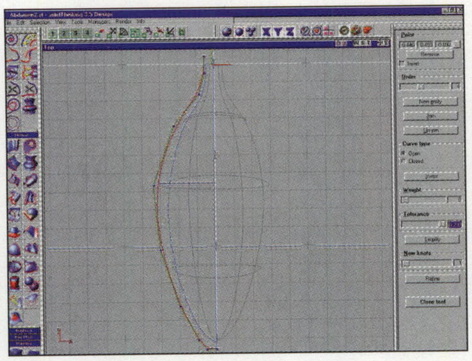
4 Tweak the curve until you're happy (or load the file Abdomen from the CD). We can also edit the abdomen's surface directly, even though it is part of a construction tree. Select the NURBS surface editing tool (Surfaces Tab) and select the Lathe. Hit the space bar to enter Edit mode. Move the points until you get something like this (Abdomen2 on the CD).



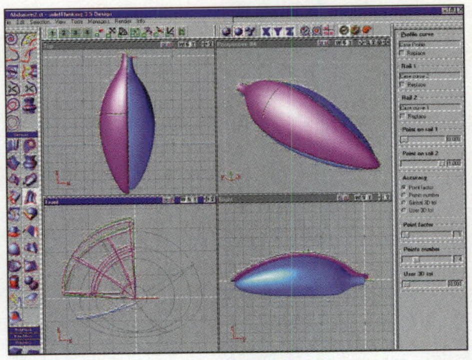
5 To model the wing covers, begin by drawing a NURBS profile curve in Front view. We've enabled grid snapping to line up the CVs better. Don't try to close the closed curve manually – hit the space bar to end drawing and then click the Closed button in the Modelling tool palette (Managers>Modelling tool).



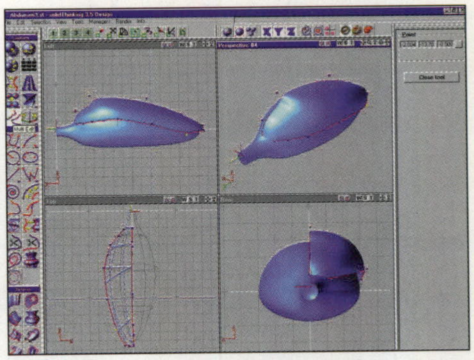
6 Select the abdomen again and click the Extract Isoparametric Curve tool (Curves Tab). You can extract two V isoparms from the surface to use as rails for the wing cover profile. Use the Parameter slider in the Modelling tools palette to choose two isoparms (green lines) that roughly define a quadrant section of the abdomen. Click the Go button each time to extract the curves.



7 The next step is very important. Select one of the curves. If you hit the space bar to go into edit mode you'll see that they have lots of unnecessary CVs. In the Modelling tool palette, locate the Simplify button and enter between 0.23-0.28 in the tolerance field above it, then click the Simplify button, *et voilá*. Repeat for the other curve.



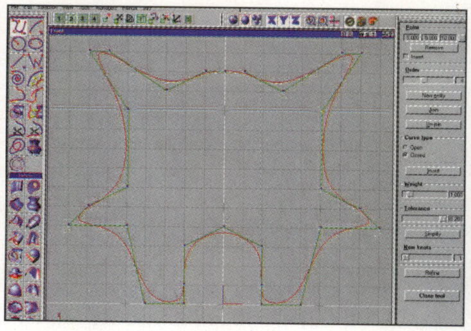
8 Now select both extracted curves (by control-clicking them in the Browser) and scale them up slightly. Hit the S key shortcut and drag in empty space to scale the curves, then the T key (Translate) to move them away from the abdomen. Select the Birail tool (Surfaces Tab) and follow the prompts in the console (Abdomen3 on the CD).



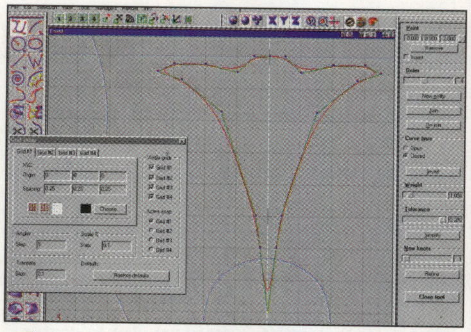
9 Again the Birail surface is part of a construction tree, so you can go in and edit the generating curves to customise its shape. Unlike many other programs you can edit multiple objects simultaneously. Select both objects first and click on the Multi-edit button (transform tab of the tool bar) (Abdomen4 on the CD).

Stage Two: Modelling the head

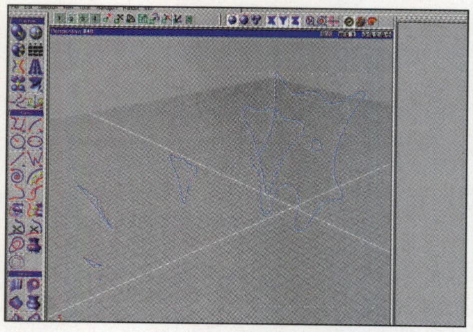
Let's give our bug some brains...



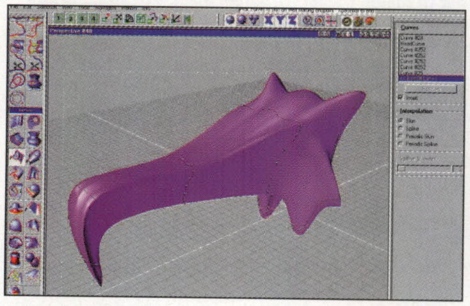
1 Moving to the head, begin by drawing a NURBS profile in Front view. Use grid snap number 2 (Snaps tool bar) and draw the curve you see here. If you have difficulty, load the file HeadCurve1.



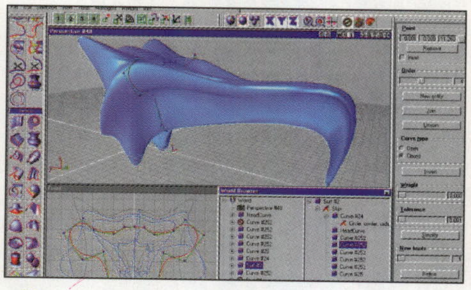
2 Choose Edit>Grid Setup and change the grid spacing for Grid 1 to 0.25 units. Now use snap 1 to draw a second smaller head profile. Zoom in to the Front view until Grid 1's markers appear. This will help you to make a symmetrical profile.



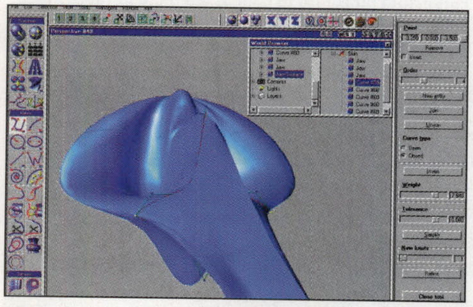
3 The smaller curve is copied and pasted an few times and moved along the z axis. Two small circles are created, one at each end of what will be the head (Head1 on the CD).



4 You can now create the head surface. Select the Skin tool (Surfaces Tab) and click each profile in turn, starting from the back of the head. The surface may start to look badly formed, but as more profiles are selected, things tend to straighten out (Head2 on the CD).



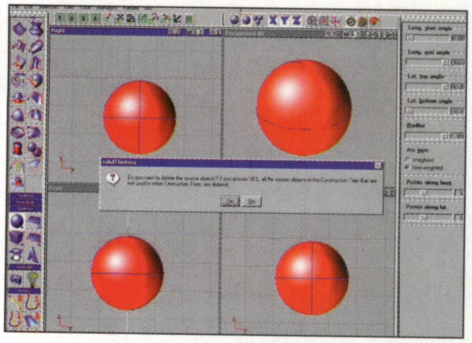
5 The profile curves can be modified to adjust the shape of the head if desired. Here we have edited the points on a few of the curves to sculpt out some details. Turn off the visibility of the surface if you find the display too slow – right-click select in the surface and choose Hide in Interactive views (Head3 on the CD).



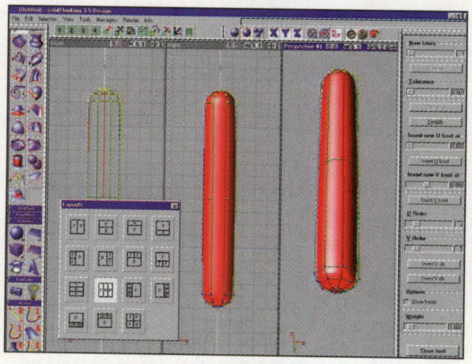
6 The same skinning procedure is used to make the lower jaw. Note that for both curves and surfaces you can alter the Weight of selected CVs. This is very useful for adding sharp edges and ridges, or for just controlling the curvature of the surface without adding extra geometry. See the file Head+Jaw.

Stage Three: Modelling the legs

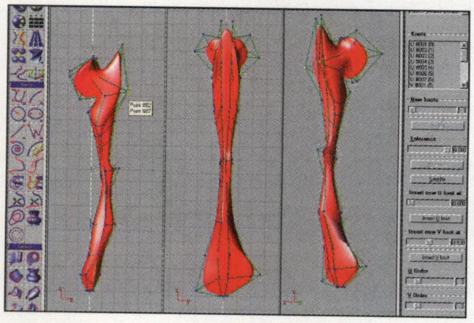
...and now we'll make him mobile



1 To make the legs you can use any of the techniques above, but instead we'll use the tried and tested method of modifying a primitive sphere (from the Primitives Tab, follow the prompts). Once added type the C key to delete its construction history and convert it to a NURBS sphere.



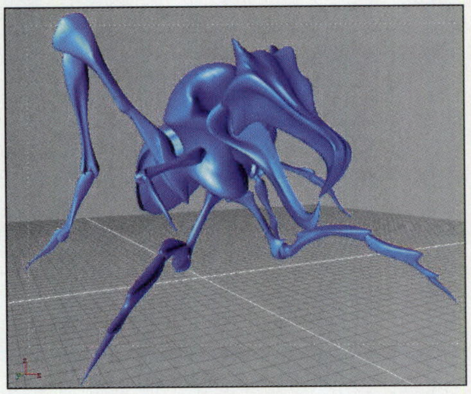
2 In Edit mode select half of the CVs, press the T key and drag to translate them in z. You can use the View>Layouts panel to make the display more suited to the task at hand. You can now begin pulling CVs to sculpt the upper leg.



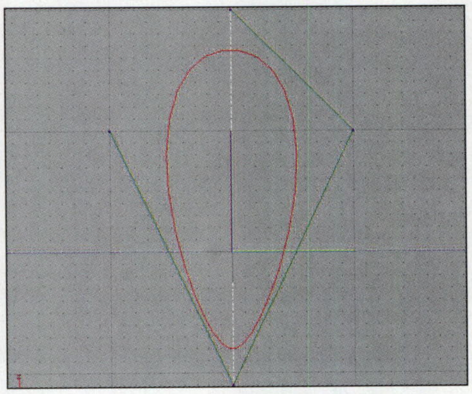
3 After a few minutes of point pulling you should end up with something resembling an insect's leg. Use the Insert New U (or V) Knot At functions in the Modelling tool palette to add extra detail where you need it. Add leg segments by copy-pasting the upper leg and re-editing the points, or start with new spheres. See the file WholeLeg.

Stage Four: Modelling the wings

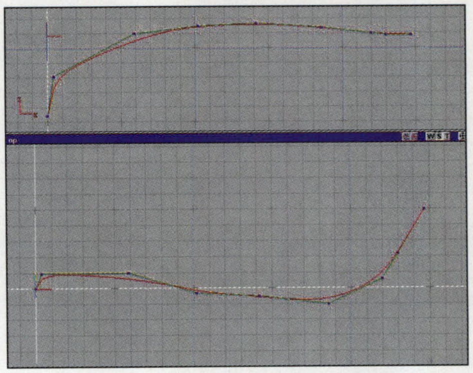
Finally, our alien insectoid becomes airborne...



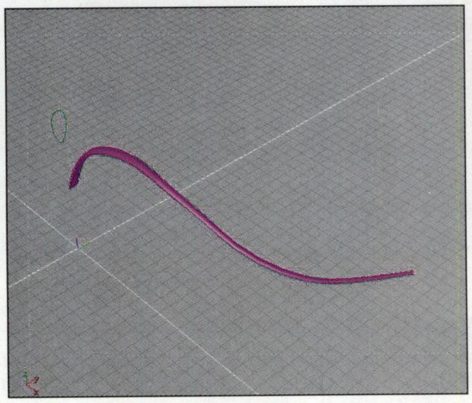
1 You can continue to make the other parts using the techniques learned so far. This WholeBug file can be found on the CD. To add wings to the bug we'll begin in a new document.



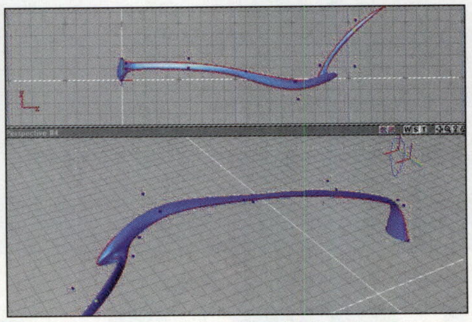
2 Begin by drawing a very simple cross-section in right view using a NURBS curve. Four points will be sufficient, and don't forget to close the curve after you accept it.



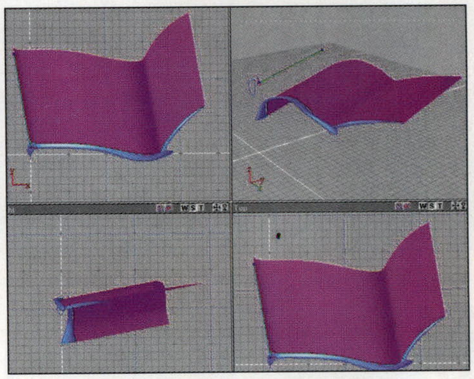
3 Next draw the first sweep path. As you add points you can swap windows to make a 3D curve, as opposed to one on that lies on a plane. The curve doesn't need to be precise because we'll edit it later once we can see the swept surface.



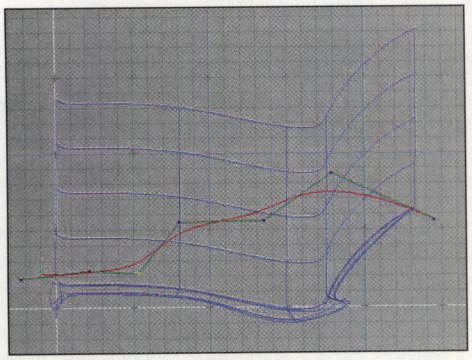
4 Now make a copy of the curve, move it in y slightly and then rotate it in top view. Choose the BiRail sweep tool and follow the prompt, clicking on the profile curve then the two path curves.



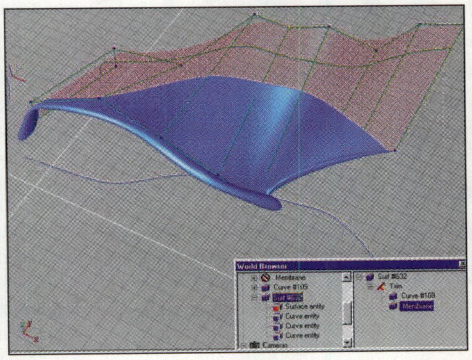
5 The beauty of the construction tree is that you can edit the path curves to sculpt the wing. Seeing the surface before you finalise the shape of objects is a great aid to visualisation. Here in Multiedit mode we can tweak the CVs of both curves at once. Don't forget that you can scale, translate and rotate groups of CVs using the S, R and T hot keys (Wing1 on the CD).



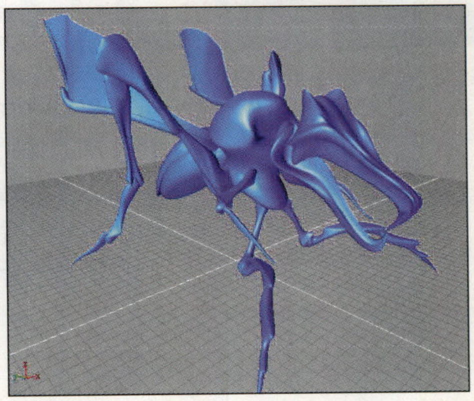
6 To make the wing membrane we can extrude the rear of the two paths. Click the extrude tool (Surfaces tab) and then click on the curve (use the browser, it's easier). Follow the prompt, and type a value of 13 for the extrusion length.



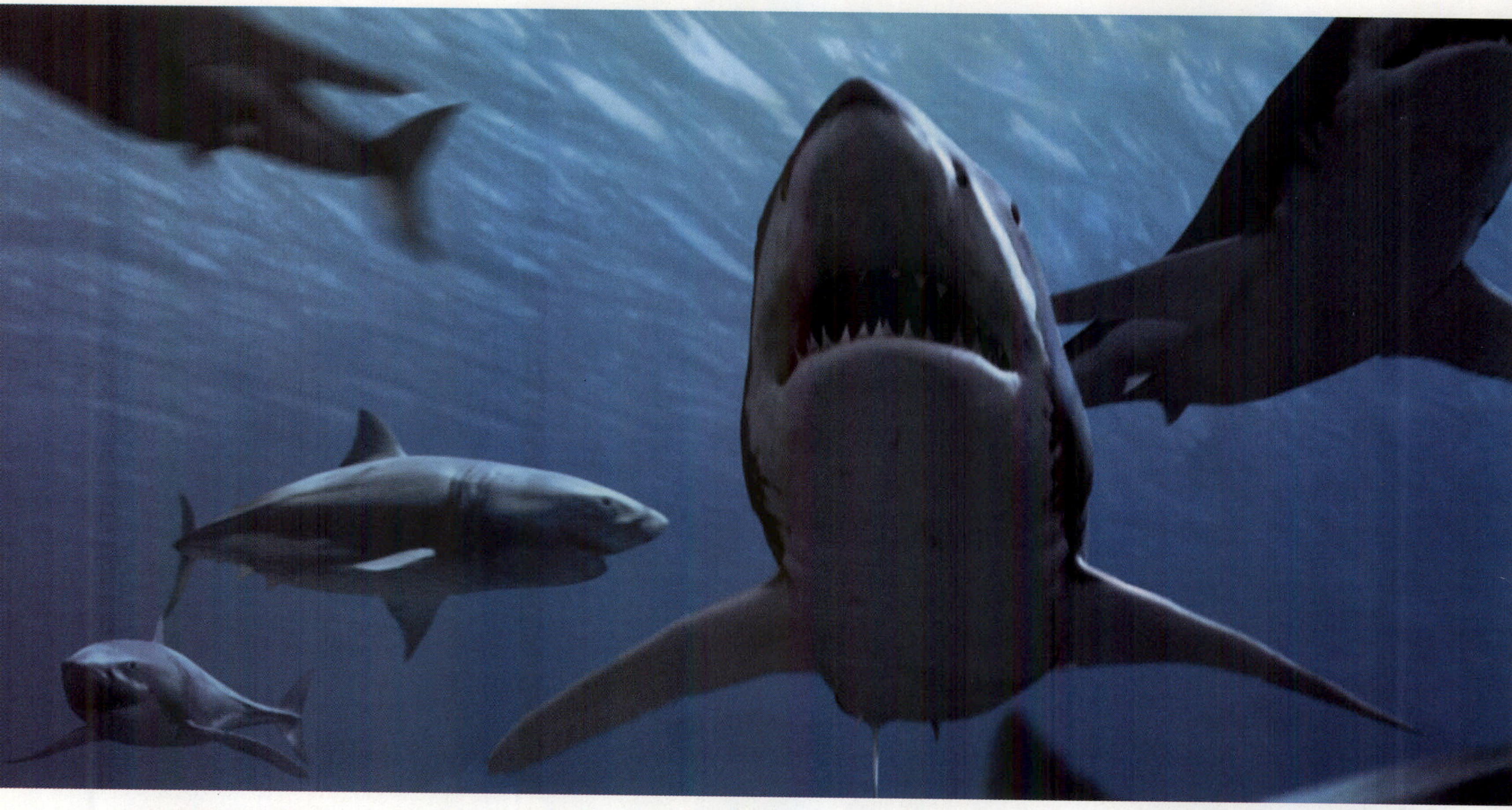
7 Make a copy of the membrane extrude, hide the original (right click in the browser to see a list of options) and then type C to delete the construction tree and convert it to a 'real' surface. If you enter edit mode you'll see its CVs. In top view draw a curve that defines the shape of the back of the wing. This will be used to trim the extrusion.



8 Select the Trim tool (Surfaces Tab), click on the trim path and then the membrane. The wing is instantly trimmed into shape. With the trimmed surface selected in the browser you can see in the right hand column the construction tree. You can select the untrimmed extrusion and edit it to remove any wrinkles in the wing (Wing2 on the CD).



9 Finally you can Use File>Merge to bring in all the bug files to assemble the final bug. Use the Mirror tool to duplicate objects and also the Group command to make organising things easier. The Final Bug is on the CD.



Magic Pictures

Hyper-realism is the objective for this new 3D studio, says director Nick Dawe.

"We can save a whole location team going down the Amazon to look at an alligator attacking somebody..."

Back in the seventies, sharks were hot news at the box office. Steven Spielberg made his reputation with *Jaws*, after all. But just when you thought it was safe to go back into the water, Magic Pictures is aiming for the 3D big time with this breathtakingly realistic animation.

It blew us away at Computer Arts Live in September, when Magic Pictures demonstrated *Maya* on behalf of Alias|Wavefront – and you can see it for yourself on our coverdisc. So we just had to ask the team to share their expertise with a modelling tutorial, and discover more about this promising new 3D studio.

Magic Pictures might be the new kids on the block, but they're aiming high. From *The Phantom Menace* to *Walking with Dinosaurs*, CGI is becoming an essential element of blockbuster projects, and the team believe they have the mix of talent and technology to create unforgettable movies, commercials and music videos.

"It would have been nice to have been involved in something like *Walking with Dinosaurs*," says director Nick Dawe. "We can create any form, any image which would be difficult to shoot in live action. It would save a whole location team going down the Amazon to look at an alligator attacking somebody – we can create all of that."

The studio was founded in London in February 1998 by Nick Dawe, Martin Macrae and Joe Najman, as an offshoot of a traditional illustration company, Folio. "I get on the phone and get the showreel into the right places," explains Nick. "The technical side comes between Joe and Martin."

When Nick founded Folio 24 years ago, the kind of 3D animation possible today was still just a pipedream. "The traditional forms of animation were available, of course – cel by

cel," he says. "It's just a natural development to get involved in technology."

The creative wizard behind the new venture, Martin boasts a background in conventional illustration work, including a three-year art course in Blackpool, before he moved to London seven years ago and joined Folio. It was his interest in 3D design which proved the catalyst for the new venture: "I started using computers on the illustration side of things but then I started animating as well and I could see the potential of what you could do with it," he says. "Very quickly you could do things with it, that was the main thing."

Perhaps the first movie to really underline what was possible with CGI was *Jurassic Park*, which Martin cites as an inspiration. "That set the standard early on, that's the main thing that got me into it," he tells us. "It's exciting that you've got the technology now to create anything you want, so if you've got the tools, the ability is there to create realistic animations."

3D animation still presents many pitfalls, but Magic Pictures believe they have the ability to overcome them. "I recently saw the film *Deep Blue Sea*," says Nick, "and I was terribly disappointed – because obviously I've become familiar with sharks, but there is a terrific market out there, we've got to let people know we exist, and we can do it better than some of the animation I saw in *Deep Blue Sea*."

With the studio still in its infancy, its main work to date has been the incredible shark sequence seen here. It was conceived as a sort of promotional video to launch Magic Pictures. Martin and the team searched for an original idea to showcase the studio's ability, coming up with storyboards and developing models, which also helped the team get to grips with the

Two images from Magic Pictures' shark animation, and a preview of its next project, an animated version of Folio's logo, a tapir. "We're going for a stylised, characterised look," explains Joe Najman.

⇨

software. The shark was chosen for its organic shape – and its visually impressive qualities. One unlikely source of inspiration was a poster Folio produced for Cidona apple juice, featuring a bottle of juice as a shark coming up through the waves in classic Jaws tradition.

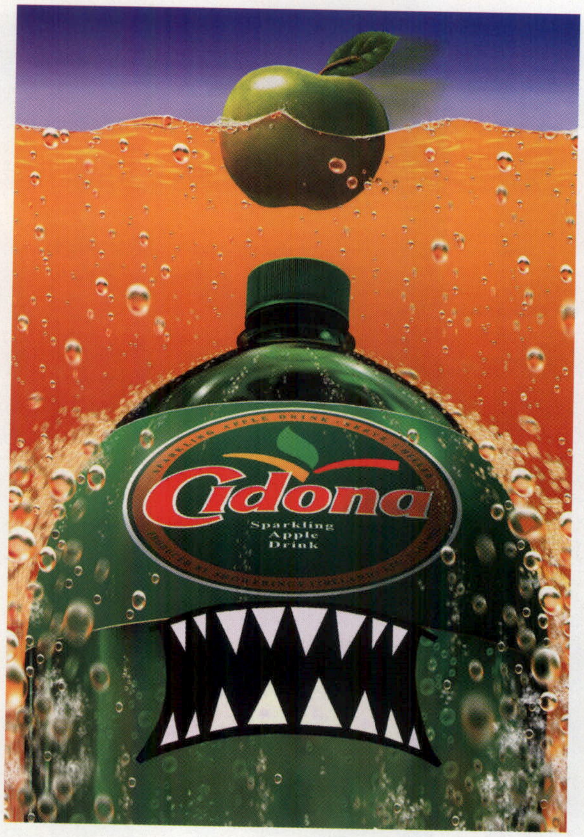
The team also checked out videos to see how a shark moves in real life – different types and sizes of shark swim in different ways – before Martin developed ways to make the shark move realistically using *Maya*.

"The key thing was to get it to drag through the water, pulling its tail as it was dragging through the water, to make that as natural-looking as possible," said Martin. "Then we built all the other models in the scene, the sea surface was created using animated textures within Maya, all the lights, texturing the seabed, the rocks, and the shoals of fish, using the same technique as the shark to animate them."

Impressively, the shark took just two months to animate, while Martin and the team were busy with their 'bread and butter' illustration work, and, reckons Martin, they didn't suffer too many headaches. "The main thing was trying to get it to look realistic, it was time-intensive, doing test renders, seeing if that looked okay, changing the light."

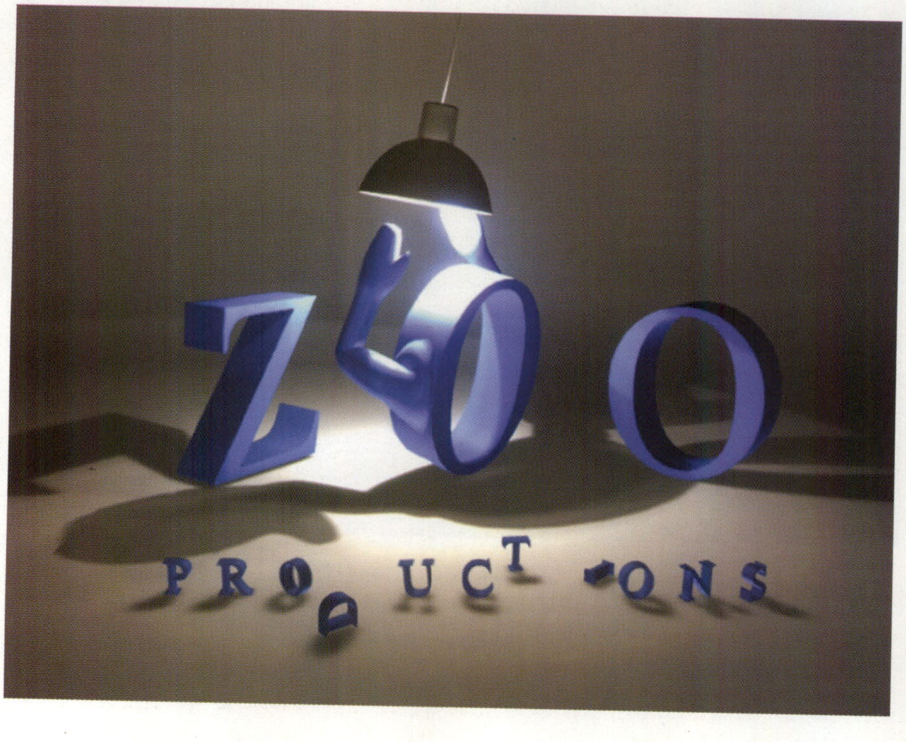
Everything in the animation was either painted or done with *Maya* – no scanned photos were used, the shark texture is completely painted. The team use *Maya* running on a Silicon Graphics 02, and Martin has nothing but praise for the package's flexibility and ease of use: "It's definitely the best for character animation," he says. "When we started, we were looking around at the different packages that were available, like *3D Studio MAX*, but we ended up going for *PowerAnimator*, which was upgraded to *Maya*, and there's no second thoughts about using any other software."

Magic's painstaking approach really paid off, says Nick: "We did show it to a diver who spent a great deal of time swimming with different fish and he thought it was extraordinary. Mr Attenborough hasn't seen it – we tried to get him for the voiceover, but he was on his way to Australia."



Top: The advertising poster produced by Folio, which inspired the shark animation. Below: An animated logo for Zoo Productions, which was the original name for Magic Pictures.

> "There is a terrific market out there, we've got to let people know that we exist, and we can do it better than Deep Blue Sea..."



So what does the future hold? The response to the shark animation has been extraordinary, generating interest from several quarters, but Nick says they'll be keeping things tight until that first big commission. One potential source is commercials, which have embraced CGI in a big way.

"There have been very good commercials lately," says Nick, "the Guinness one with the white horses, Nike do some stuff which is particularly good, so commercials would be a way to get in, because you get spotted then by the live action people."

On the immediate horizon is an addition to the showreel – an animated tapir, based on Folio's logo. As Martin explains, it represents an altogether different challenge: "We're trying to figure out what's the best way of getting a four-legged creature to walk, and getting it to look realistic."

"Something like this is very difficult to find out because not many people have been out photographing moving tapirs, this particular chap is not that easy to find!" laughs Nick.

With a minimum of resources, and a lot of sweat and ideas, Magic Pictures is an inspiring example of just what can be done with a tiny set-up. But as people's expectations of photo-realistic animation increase, the real challenge lies ahead.

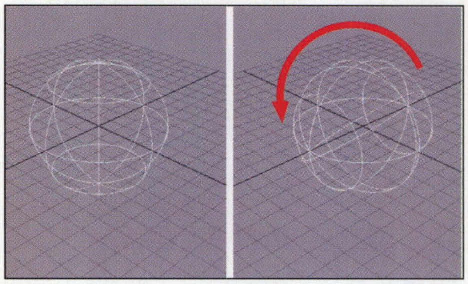
Nick reckons they can more than meet it, though: "That's why I think Martin's base as an artist brings more to the table than a normal operator would, because of his experience in that direction. So we'll see..." ca>s

Information

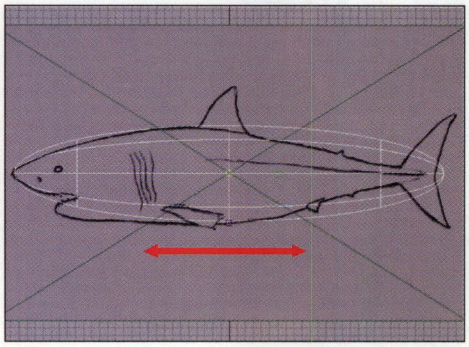
Contact Magic Pictures on t 020 7 404 4747 or f 020 7 242 1816.

Magic Pictures show you how to model your own shark

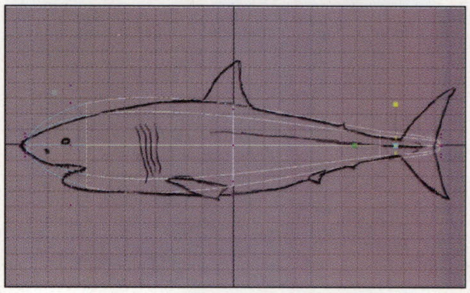
Creating a realistic looking shark is easier than you might think. Here Magic Pictures demonstrate how they made their shark. Though Martin Macrae at Magic Pictures originally modelled the shark using *Maya*, the tutorial is written so that anyone with a NURBS modelling package can follow it. One of the advantages of NURBS software is that you can achieve smooth surfaces with lower resolution geometry – useful when creating an organic model like a shark...



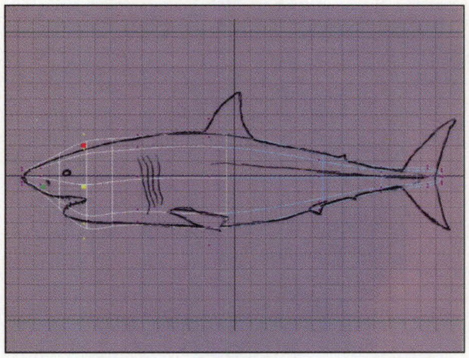
1 Create a NURBS sphere and rotate it so that the poles run in a horizontal direction. This orients the sphere in the correct position for scaling. Bring photos or drawings of the shark into the side and top views as reference for the shape.



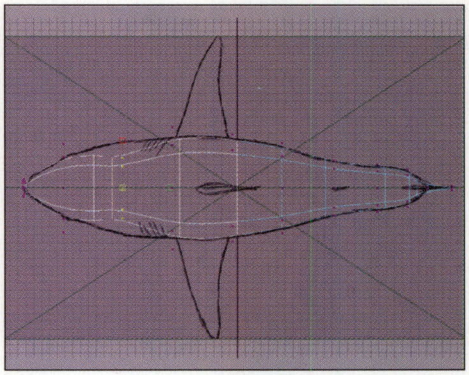
2 Scale the sphere in a side view so that it roughly covers your side view drawing.



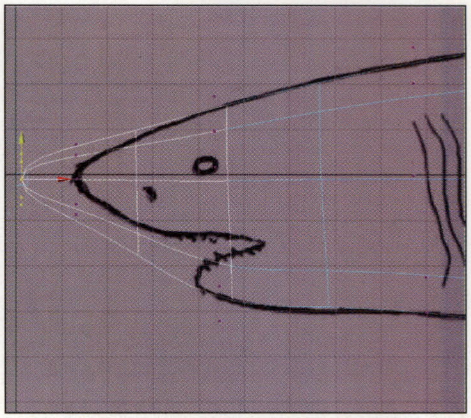
3 You can now select, scale and move 'hulls' (groups of CVs) to fit the profile of the shark's back and underside. Try to keep the columns of CVs evenly spaced to avoid creasing.



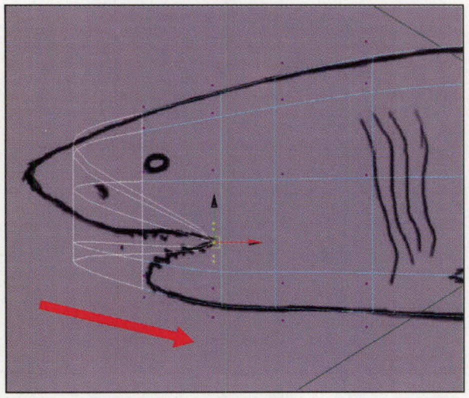
4 To achieve the desired shape of the shark profile, insert new isoparms in the locations where greater detail and curvature are required. The general rule of thumb is to insert detail only when it is needed. Too many CVs will make later modifications difficult to manage.



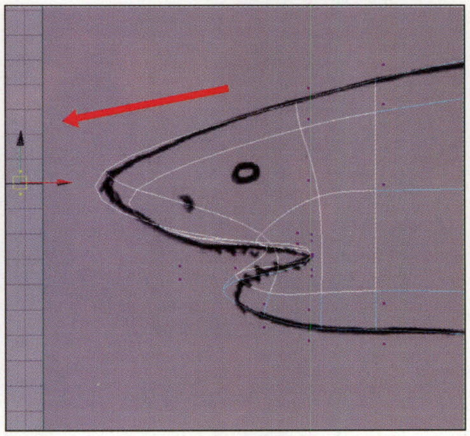
5 Once the model looks good in the side view, you can now use the front view and top view to model the width of the head, midriff and the tip of the tail as it tapers to the end of the body. The end CVs of the tail should be scaled almost to nothing.



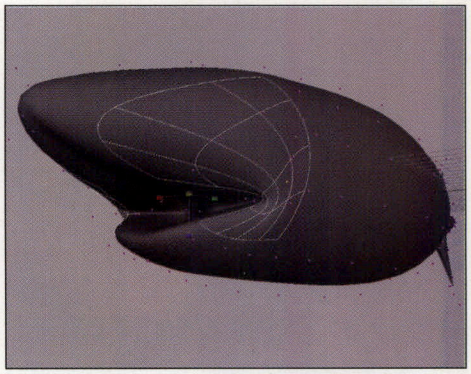
6 You'll need to model the geometry beyond the nose a little to prepare for creating the mouth opening.



7 To create the mouth opening, several methods can be used. We found the best result for this purpose was to marquee select a bunch of CVs at the nose end of the sphere in the side view and pull them back into the shark.



8 Then you can select CVs at the end of the nose and bring those forward to start getting the correct shapes.



9 At this point you can get a shaded perspective view up and really start to put the finer details into the model. Use the side view to select and scale groups and individual CVs, so that you will also select the same CVs on the opposite side of the model to retain symmetry.

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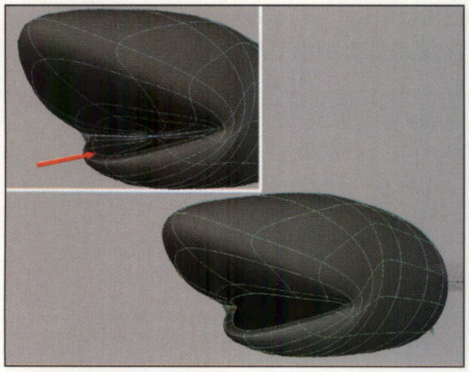
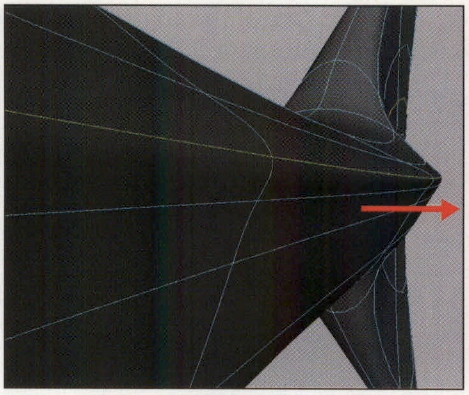
Give your great white some teeth

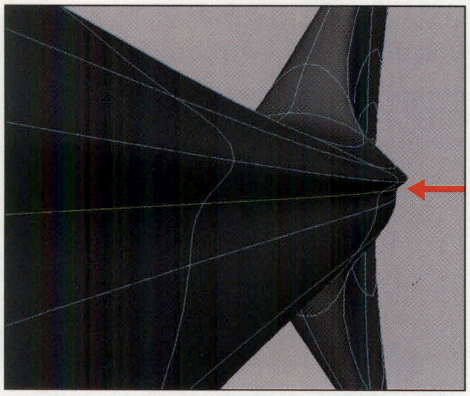
By now, the shark is starting to take shape – and get its bite...



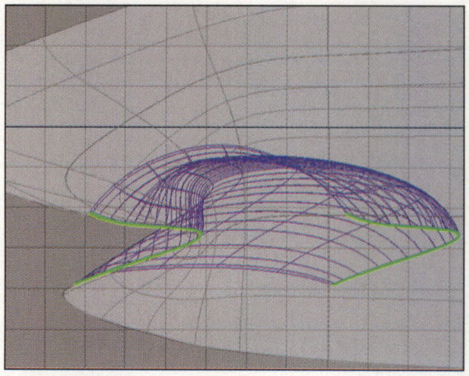
10 Next, you will need to cut away the access geometry. Conveniently we can do this quite easily by selecting one of the isoparms at the location of the edge of the shark's mouth. The model can be detached at this point and the end of our sphere deleted.



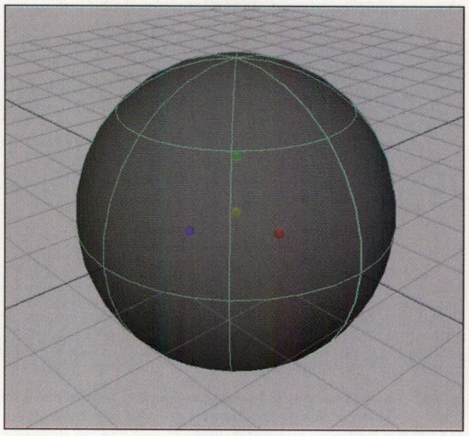
11 There is a streamline ridge, which runs along the back of the shark and ends at the tail. To model this we picked a selection of CVs on both sides and scaled them out in a front or top view.



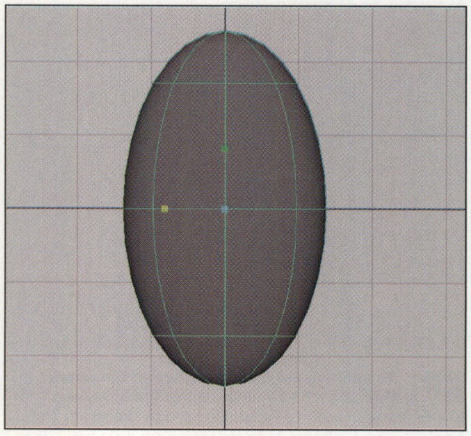
12 Then more isoparms were created either side and scaled back in. This can be a tricky operation. To get it looking just right, a fair amount of tweaking will be necessary.



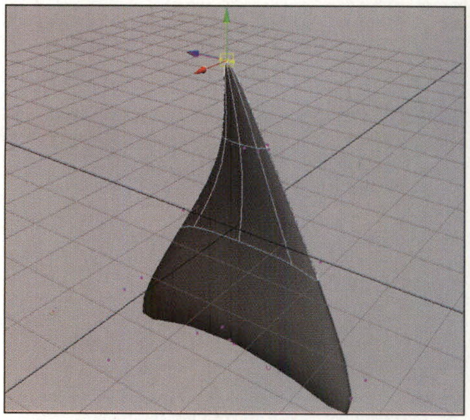
13 To make the inner palette of the mouth we duplicated the curve at the edge of the mouth and this in turn was moved back into the shark's mouth. A skinned surface was then created between the edge of the mouth curve and the duplicated curve.



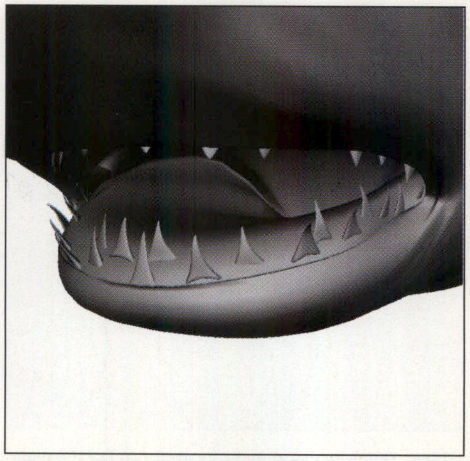
14 The teeth of our shark were made by creating a NURBS sphere.



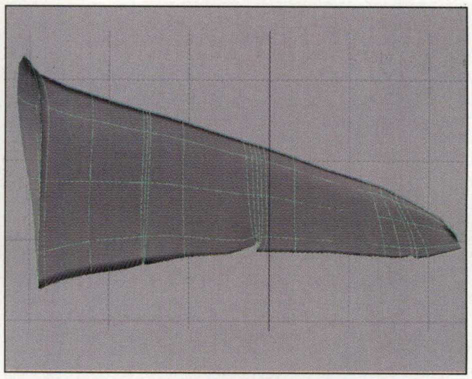
15 It was stretched and squashed using the scale tool to obtain the general shape.



16 The curly shape of the tooth was achieved by selecting groups of CVs and moving them to the desired positions. Three or four tooth variations were made and copied to create the whole set of teeth.



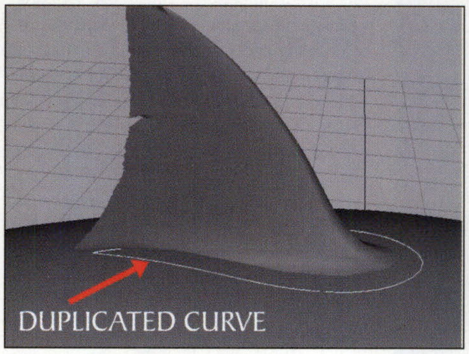
17 Here we can see all the teeth in position, placed intersecting the shark's inner mouth.



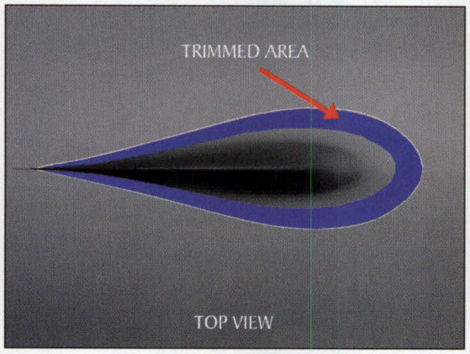
18 Modelling the fins involved exactly the same process as the teeth but using a half NURBS sphere and scaling rows of CVs to get the correct shapes. Note that the extra detail was achieved by again inserting isoparms in the desired positions as and when required.

The finishing touches

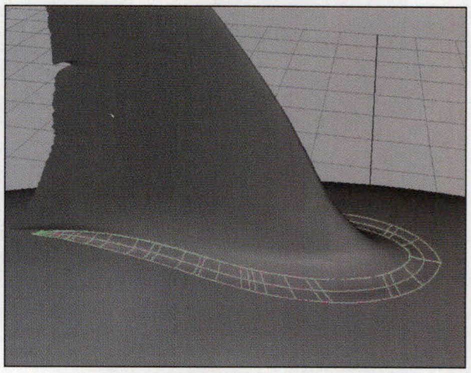
Adding fins and final shapings...



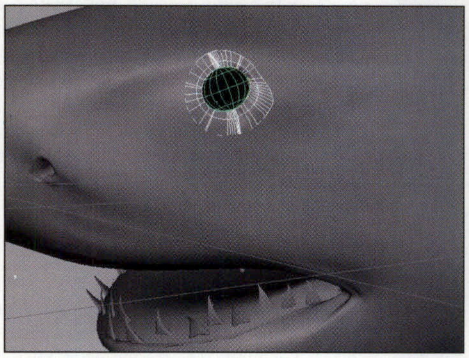
19 The dorsal fin was scaled and moved to the correct size and position and attached to the main body geometry using a blend surface. To do this, first, with the fin in position, we duplicated the bottom curve of the fin to get the shape. This curve will be used to cut a whole out of the main body.



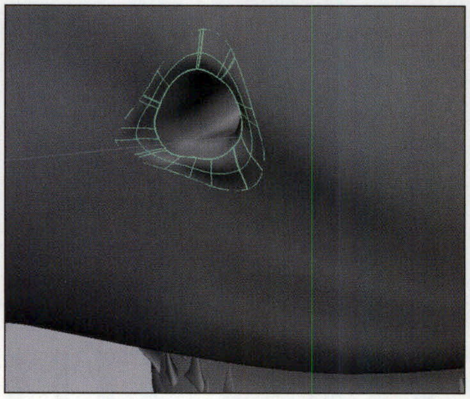
20 The duplicated curve was scaled and positioned in the top view and then projected onto the main body surface. The resulting curve on surface defines the edge where our blend surface will connect to the main body. The area within the curve was trimmed (cut) away.



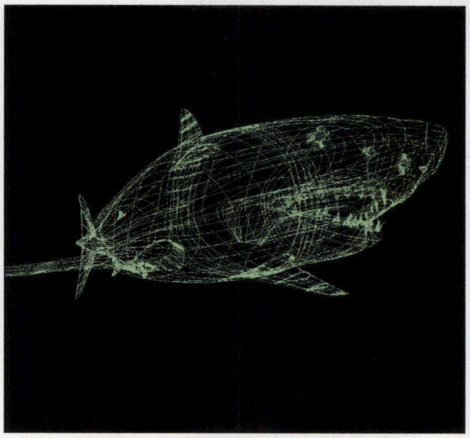
21 Finally, a blend surface was created between the edge of the fin and the main body. This is easier said than done. A good blend is only achieved by trial and error. A typical mistake is to make the trimmed area too small.



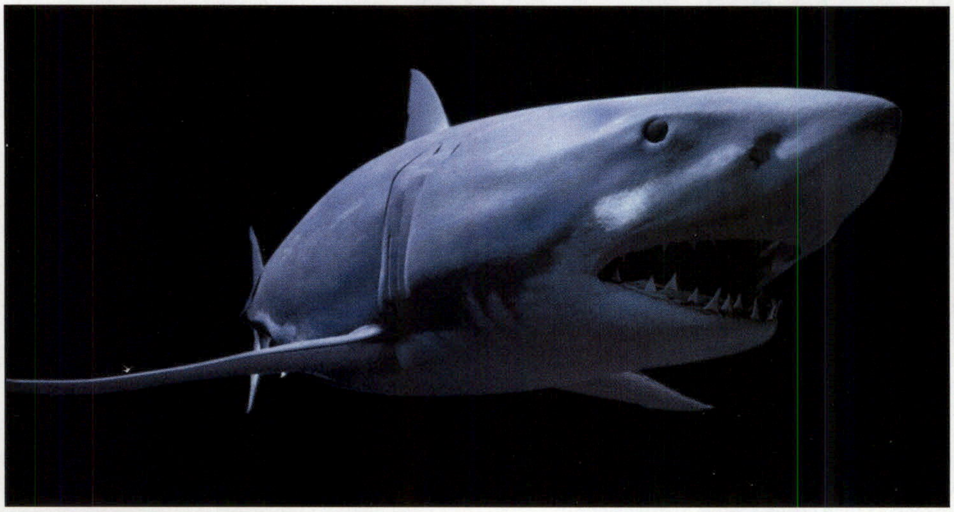
22 A similar technique was used to make the eyes and nostrils. The eyeball was a flattened half sphere, again scaled in size and moved in position. A bigger area around the eye was trimmed away and a blend surface was created to connect up with the edge of the eye.



23 To make the nostrils, we again trimmed an area out of the main body, duplicated, scaled and moved the edge curve. A blend surface was created in the same fashion as the eye in the previous figure.



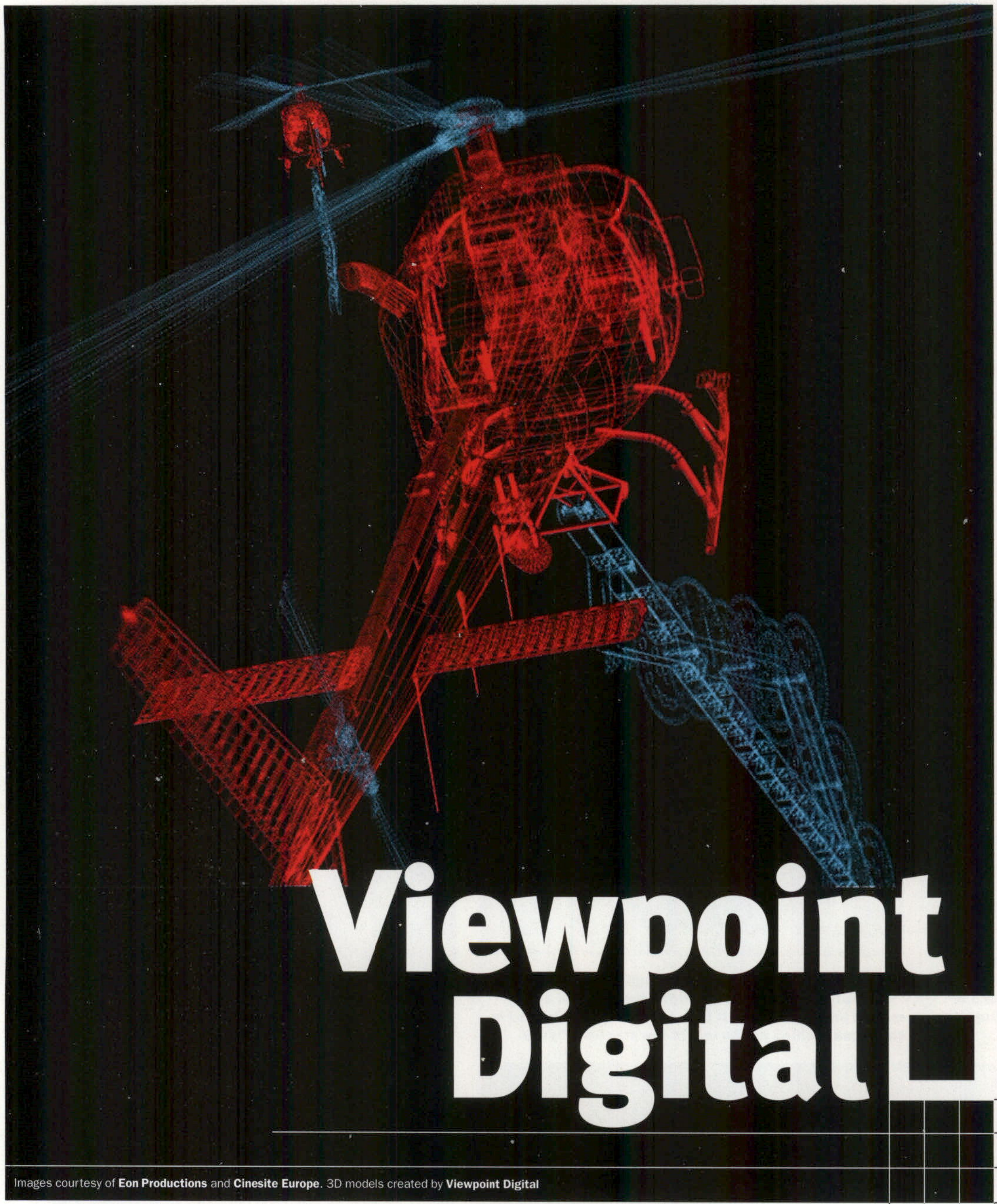
24 The shark model is now complete, ready for you to apply the texture.



25 And here it is – the fully-textured great white shark in all its fearsome glory – as seen in Magic Pictures' showreel animation. Don't go too near the water's edge, now... ca-s

MAGICPICTURES

Tutorial by Martin Macrae and Joe Najman from Magic Pictures, using Alias|Wavefront *PowerAnimator 8.5/Maya 1.0*



Viewpoint Digital

Images courtesy of **Eon Productions** and **Cinesite Europe**. 3D models created by **Viewpoint Digital**

007 IS SAVING THE WORLD AGAIN, THANKS TO VIEWPOINT DIGITAL AND A BRAND OF WIZARDRY THAT EVEN Q COULDN'T MATCH...

He might have part-ex'ed his Aston Martin DB5 for a BMW Z8, but 007 still maintains a healthy regard for Queen and country. The same goes for Eon Productions, producers of the Bond movies, which employed British-based Viewpoint Digital to create the 3D models for the latest epic, which were then integrated with live action footage.

The World Is Not Enough, which was one of the first projects awarded to Viewpoint Digital Europe since establishing its on-site production studio in the UK earlier this year. In his 19th celluloid adventure, 007 is assigned to protect an oil heiress attempting to control six trillion dollars worth of oil found in the Caspian Sea.

The film, launched in the UK last month, makes great use of the company's facilities, employing 3D models to create a series of action shots ranging from chase scenes to explosions. Viewpoint worked alongside UK production companies to create the scenes, using SGI O2 and Indigo 2 workstations; *Maya*, Alias and Nichimen software; and Viewpoint's own proprietary 3D tools. The models were used at key moments in the film, ostensibly to save money and reduce risk. Working alongside London-based Magic Camera Company, Viewpoint created a virtual para hawk – a snowmobile/parachute combo, complete with machine guns and propellers – for a chase sequence in the film. Eon initially shot live action of the actors riding and flying the vehicles. When the weather made it difficult to shoot, Viewpoint was enlisted to create a computer-generated version of the para hawk to mix with and supplement live footage.

Undercover intelligence

From its Pinewood Studios base, where much of the film was shot, Viewpoint's modellers were able to gain access to the para hawk and digitise it. Photographs of the vehicle were also used as reference material to build a detailed model with over 50,000 polygons. The parachute posed a particular challenge because it needed a 'light and airy' look to mix with the footage. The high-resolution model was eventually created in less than two weeks at a fraction of the time and expense needed to send the actors and crew back on location to the Alps. The use of 3D models also reduced the risk of some unfortunate extra meeting an abrupt end in the treacherous alpine conditions.

Mara Bryan, visual effects supervisor at Eon, says: "Using Viewpoint's services offered us many advantages. First, by digitising the actual aircraft we received an accurate 3D model that was perfect for use in conjunction with the live action counterparts. Moreover, the post-production company was spared a labour-intensive model building process and could

> "Viewpoint's corporate tentacles reach far and wide, spanning entertainment and visual simulation, while the company has populated a myriad of games and films with its 3D models..."

The para hawk in all its glory, as it appears in *The World Is Not Enough*, in pursuit of 007 himself. Viewpoint's model saved the production team both time and money.

concentrate on the texturing, lighting and animation. In all, Viewpoint offered a very fast and cost effective service."

When not immersed in the latest action movie, Viewpoint is busy building armies of 3D models, both stock and custom made, for a plethora of projects. Originally known for its database of wire frame meshes, Viewpoint has been expanding its operations to include custom modelling and animation services, and more recently, the development of a texture database for 3D models.

Today, the company's corporate tentacles reach far and wide, servicing industries spanning entertainment, visual simulation and the more sedate world of corporate communications. Viewpoint has populated a myriad of games and films with its 3D models, including *Deep Blue Sea* and *Inspector Gadget*. But it is perhaps its work in the post-production industry for which its European arm is better known.

"We've seen a real increase in business, particularly from the post-production sector," says Daphne Rowan, European director at Viewpoint. "The addition of our creative team to the UK office has enabled us to provide an improved service to customers because we now have production capabilities in their own time zone. This is backed by a global creative team of more than 60 modellers providing production services around the clock. This enables us to maintain our position as a fast and effective resource in the deadline-critical business of post-production, film and games."

Graveyard shift

London-based post-production house Glassworks has been using Viewpoint Digital for three years. It recently completed a TV commercial for Honda featuring a graveyard of abandoned cars. Alastair Hearsum, head of 3D at Glassworks, says: "We used models from Viewpoint's libraries to create the graveyard. It was great to nick different bits of various cars." And cheaper too, he adds: "By licensing models from ready-made collections, the stuff is all there and you can chop and change until you're happy with the result."

Molinare, a post-production house based in Spain, also relied heavily on Viewpoint's library collections for a traffic scene in *Entre Las Piernas*, a movie by Spanish director Gomez Bereira. Molinare, which has been using Viewpoint's services since 1995, used library models because of the wide range of cars available and the lack of time and resources to model from scratch.

But it's not just cars and para hawks that get the Viewpoint treatment. When a 3D model has to understudy for a well-known actor, Viewpoint's scanning services provide a high level of detail designed to fool even the most critical eye. Using a Cyberware scanner, celebrities such as Tom Cruise, Bruce Willis and Arnold Schwarzenegger have all been digitally cloned. After an actor is scanned, proprietary software is used to create efficient models without the need for geometric reduction programmes.

Meanwhile, demand for 3D models continues to grow. The recent trend in outsourcing is largely attributable to the shift from 2D to fully immersive 3D environments. But it takes a massive amount of 3D work to populate these virtual worlds.

Add to this a chronic skill shortage and many games developers and post-production houses are left with little choice but to outsource work or license models from existing 3D libraries. Happily, recent Hollywood exposure and big name entertainment titles have lent a certain cache to this approach. And Viewpoint is more than happy to cash in.

But as the population explosion of 3D models on our screens continues unabated, the rest of the world barely registers. Which is perhaps, exactly how it should be.

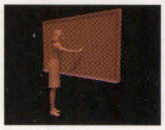
Information

Viewpoint Digital can be contacted on
t *01753 650 104,* ***f*** *01753 654 081 or*
w *www.viewpoint.com*

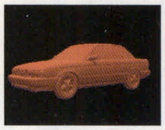
Meshes

on the CD

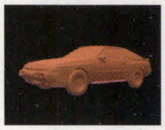
Here are the 10 meshes on our CD



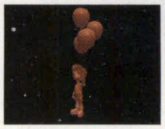
VP24504 Teacher



VP20575 Nissan Tsuru 94



VP20928 Mitsubishi Conquest 88



VP24152 Boy with balloons

VP11978 Gorilla

VP23514 Caravelle plane

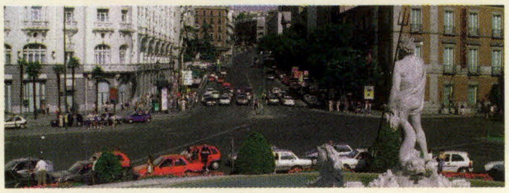
VP22572 Vespa scooter

VP3969 Polnochny (ship)

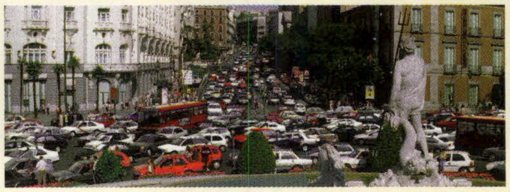
VP22317 Vintage television

VP20065 Hall

Gridlock How Viewpoint Digital helped create a Spanish traffic jam...



The empty street scene, from the movie *Entre Las Piernas*...



...and now it's chaos, thanks to Viewpoint's library models.

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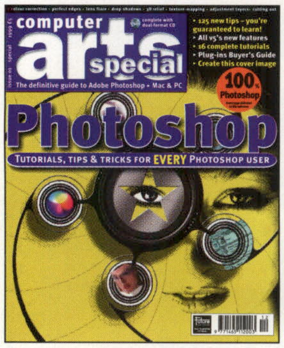
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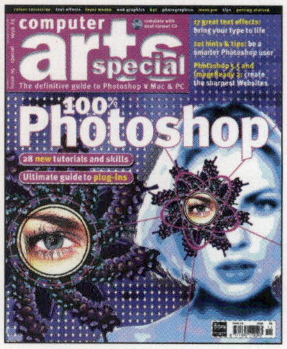
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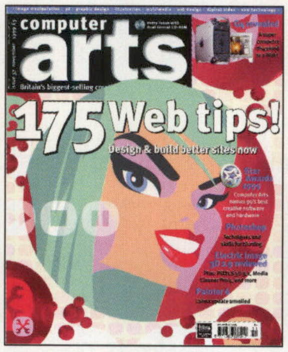

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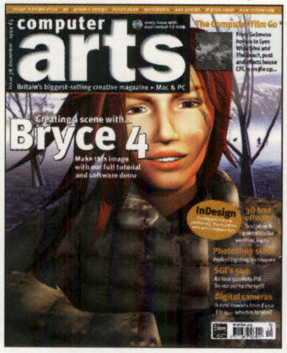

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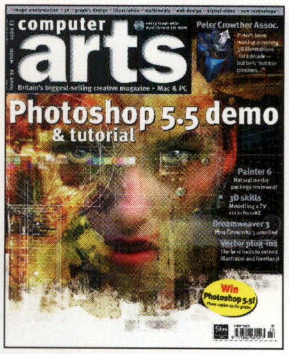

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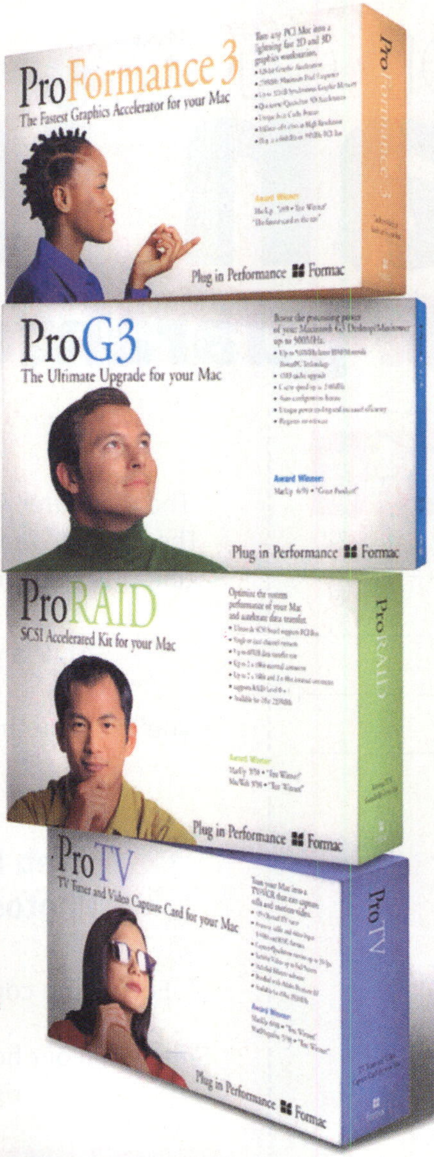
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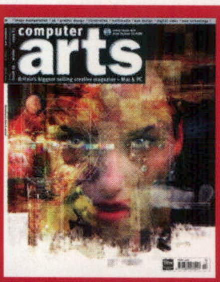

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animation intro

PUTTING YOUR MODELS INTO MOTION IS TOUGH, BUT YOU'VE COME TO THE RIGHT PLACE FOR INSPIRATION

Animation is probably the toughest of the 3D disciplines. If it's total realism you're striving for, the slightest imperfection can throw the viewer and turn him or her right off the precious masterpiece that you've spent sleepless nights putting together. It can be an even bigger kick in the teeth if your rendered models look ultra real but you just can't give them proper-looking motion.

Going for the exaggerated style of movement seen in cartoons might seem like an easier option, but this isn't necessarily the case. Yet here again it's ever so easy to create an inappropriate action which steals attention away from your characters and storyline and leaves the viewers thinking, 'Well that looked computer generated...'

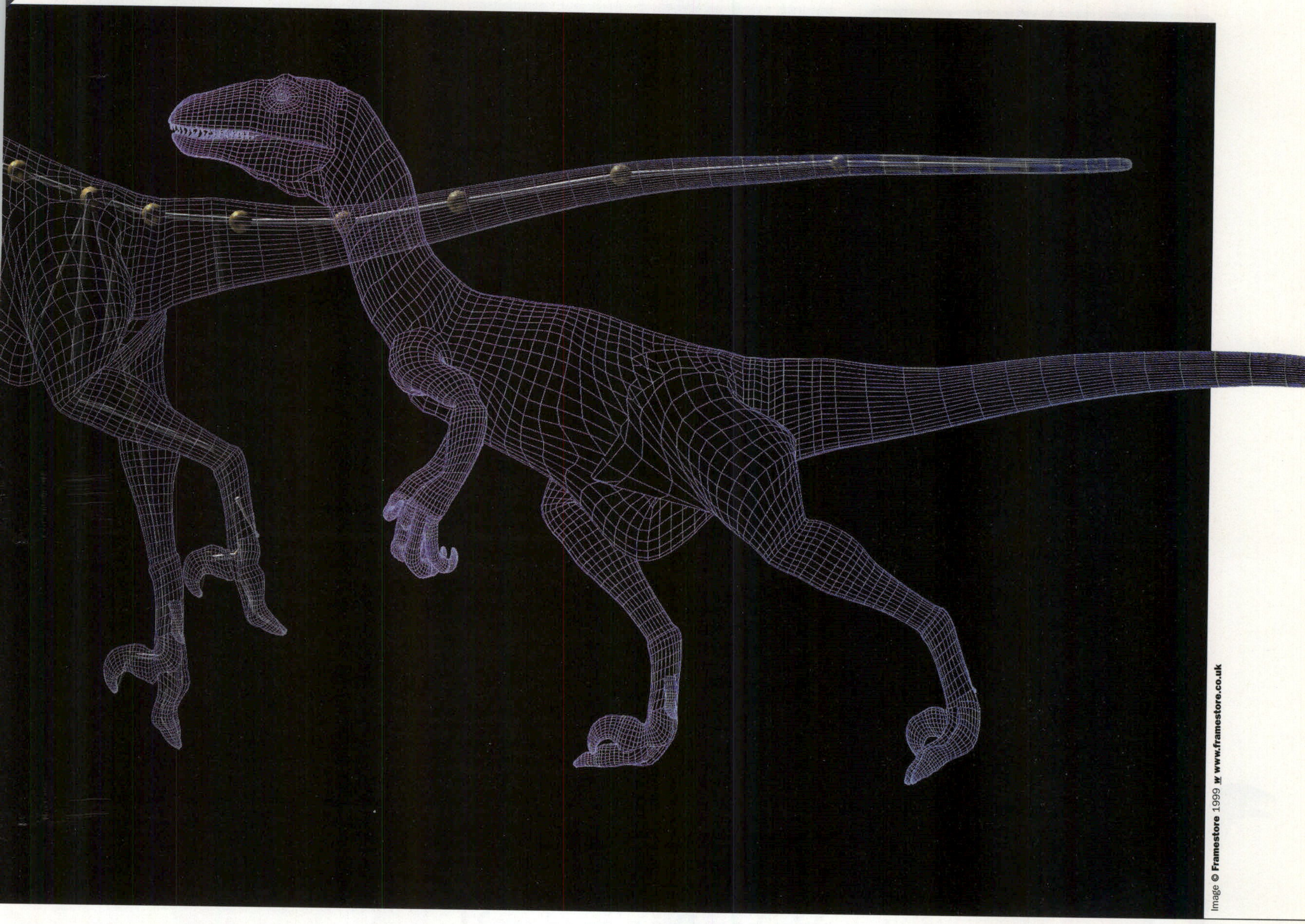
Here in our 3D Special we decided to go to the pros to get some expert tips on animation. First up we talk to the animation team at Framestore who worked on the BBC's recent award-winning *Walking with Dinosaurs* series. We'll find out how they brought to life creatures that haven't walked the earth for millions of years, and the techniques behind the captivating levels of realism witnessed in the show,

Then we pay a visit one of the country's premier motion capture studios, AudioMotion, to find out the latest news on this cutting edge animation tool. Is the animator destined to become a dying breed on the CG scene? Find out here in our 3D Special Animation section...

Dances with Dinosaurs

ANIMATING PREHISTORY WITH FRAMESTORE...

"The movement has to be adapted because they don't exist," says Mike Milne, director of animation on *Walking with Dinosaurs*. We go behind the scenes of this epic TV series



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Animating animals is no easy job – especially if you want to make sure your computer generated 3D pooch looks real, and definitely not like a computer generated 3D pooch. But what if the animal you're trying to animate in photo-realistic graphics isn't some run of the mill cat or dog, but has in fact been extinct for over 65 million years? This was the challenge faced by Framestore when it took on the task of creating the BBC's recent series *Walking with Dinosaurs*.

Judging by the audience response to the programme – up to 20 million people watched some episodes – the animation team came up trumps, even if some scientific commentators did complain that their interpretation of dinosaur motion was based on supposition. "Of course it's made up," admits Mike Milne, Framestore's director of animation. "They don't know how they moved – they have no idea. And so our idea was to get palaeontologists to help us, to say what they could and couldn't do. Then it's the skill of the animator in choosing behaviour that rings a bell with the viewer. Yes, of course, it's supposition, we're not denying it, but I think the proof is the fact that millions of people watched every week."

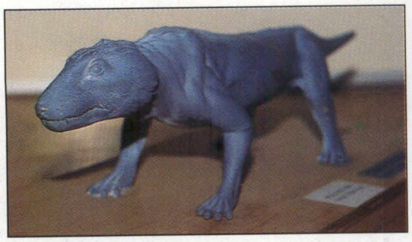
Modelled and scanned

The first step in the process was to sculpt a model of ⇒

Dino models

Sculpted, moulded and scanned...

For each creature in *Walking with Dinosaurs*, Framestore commissioned a sculpture which was scanned in 3D and turned into a computer model. Here's the baby Diplodocus.



At first some of the dinosaurs were painted as well, but since texturing could be done on-screen, others were scanned as simple grey forms like this mammo-reptile, the Cynodont.

In some cases separate heads were sculpted so that higher resolution scans could be created for close-up animations.

each of the 40 species in the series. Here there was little argument about the authenticity of the creatures – palaeontologists widely agree on their shapes. Once a physical model of each beast had been moulded, Framestore had 3D scans of it made at Soho-Cyberscan. First, a complete body scan of the animal would be taken at around three million polygons, then a separate scan would be made of the head for a further two or three million triangles. "The reason that you have a separate head is that you tend to see their heads in closer detail," explains Mike Milne.

Feeding the hugely dense polygon meshes into a CGI network running *Softimage|3D*, they were reduced to lower resolution models that the animators could work on. With models down to a few thousand polygons, the artists could experiment quickly and easily, without having to wait hours for each pose to render. Now the tricky business of putting realistic movement into the creatures could begin. Apart from palaeontologists, who provided pictures, diagrams and advice on bone structures and the limits of each creature's movement, Framestore's animators relied heavily on the observation of contemporary animals.

Books like Eadweard Muybridge's *Animal Locomotion* (Dover Publications, ISBN 0486237931) proved handy, as did the BBC's archive of natural history footage. "Basically the animators would call up this one guy at the Beeb and say, 'quick, we need eagles, or quick, we need rhinoceroses' and he would put together as many bits as he had on a tape and send it over," says Milne.

Hunter attitude

For instance, when lead animator Virgil Manning was working on the Tyrannosaurus Rex, he could combine palaeontologists' advice with his own notes on how carefully selected contemporary animals move. The poise of T-Rex's feet were based on ostrich feet, while big cats inspired its hunter attitude. When putting together an eating scene, Manning looked at birds of prey: "There's this one-shot where it's eating the Triceratops, and it's pecking at it. It's got its foot up on the carcass and is ripping the meat out. So we looked at some eagle footage because of the fact that they put a foot on their prey and peck bits out.

"It was all just looking at it and seeing what looked right, getting loads of weight into it so that it looked heavy all the time, and making sure that when it did movements they were really nice and vicious. If it

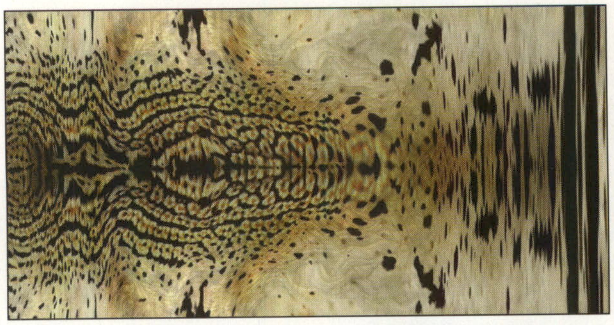
> **"We were looking at T-Rex, seeing what looked right and making sure that when it did movements they were really nice and vicious"**

Textures: a raptor-skin handbag, madam?

Creating those prehistoric skins

Colour doesn't fossilise, so Framestore relied on the talents of skin designer Daren Horley to give the creatures hue and texture. Using *Photoshop* he first created greyscale bump-maps for the scaly textures, then coloured them up.

Like many of today's animals, the dinosaurs are countershaded – dark on top, light underneath. And like contemporary creatures, Daren often gave smaller creatures bright colours, leaving larger ones, like Diplodocus, in duller shades.



Side-on and overhead views of each dinosaur were painted and combined into a single texture that could be stretched on to the model in *SoftImage*.

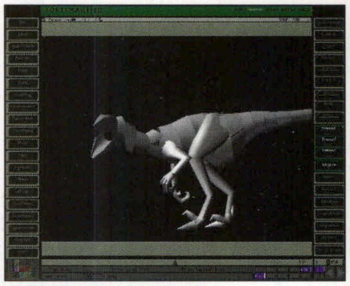
Run Raptor Run: lethal predators on the move...

The raptor had to look fast, agile, clever and deadly

The T-Rex might be the most celebrated predator of the past 200 million years, but *Jurassic Park* brought a new type of scaled baddie to popularity in the form of the Velociraptor. *Walking with Dinosaurs* featured a cousin of this creature, the Utahraptor.

In the animation process, many of the Raptor's mannerisms were taken from birds. Indeed, according to palaeontologists, raptors may share distant ancestors with birds. "I think we had to base it on a road runner, that would be the nearest thing with the way it ran," explains lead animator Carlos Rosas. "That was much closer to a raptor than an ostrich. Eagles, and birds of prey, just the way they move and observe their prey – we used that."

They may have been eight foot tall, but in action the *Walking with Dinosaurs* team deliberately made the raptors move quicker and with more agility than the T-Rex. Because palaeontologists reckon they probably stalked their prey in groups, lions and other social predators were also studied by Framestore for their hunter attitude.



Primitively shaded models like these were used to preview and perfect the Raptor's movements.

The finished Raptor looks both intelligent and athletic, with plenty of menace. The perfect predator?

The Stegosaurus: laid-back and well protected...

Seven tonnes, 12 metres long, brain the size of an orange

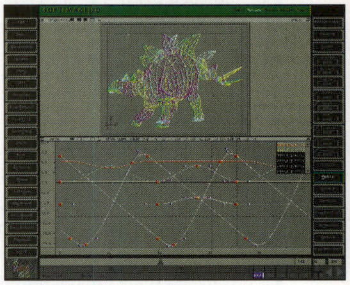
Though it looks quite deadly with its plated back and spiked tail, the Stegosaurus was a docile plant eater. And docility was something lead animator Virgil Manning really wanted to bring out in this particular creature.

"He was kind of like an elephant, but he had the same thing that the Diplodocus had in that his front arms were shorter than his back legs, so we had to kind of play around with it a bit," explains Virgil.

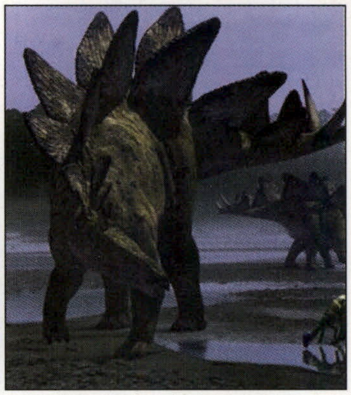
"He had a slightly more lazy attitude than the Diplodocus. The Dip was more of a determined walker. The Stegosaurus, in our stuff, he never really had to walk anywhere or over any distance to eat. He just kind of plodded along. Even though he was quite a bit smaller than the Dip, he still moved quite slowly."

> *"The Stegosaurus never really had to walk anywhere, he just plodded along"*

When threatened in the series, the Stegosaurus turns sideways to its prey, displaying plates flushed red with blood, and waggling its deadly tail.



The Steg as a wireframe in *Softimage*. The bottom panel displays the f-curves defining the movements of its bones.



Short front legs gave the Stegosaurus a strange gait. It also had a tail which doubled as a powerful spiked weapon.

Deeply dippy: introducing the Sauropods...

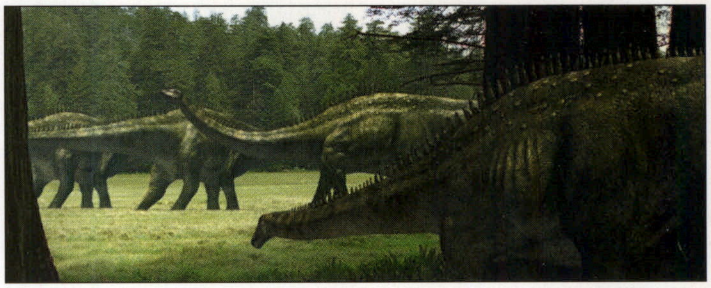
The Diplodocus came from a huge, lumbering family of plant-eaters

The Sauropods were slightly similar in bone structure and weight distribution to modern elephants, so to come up with ideas on how they moved, the animation team paid a visit to Woburn Wildlife Park to watch, and touch, the elephants.

"We could just see how the bones moved on the creature, and we could actually feel where the bones were and how the skin moved on the creature. Actually that was more useful – how the skin moved," says Carlos Rosas. While the body and legs were based on elephants, the long neck and tail had to be added in a realistic way. The swaying of the head, and the wobbling of the flesh were tied into the creature's footfalls.

Parameters of movement were supplied by palaeontologists. "There were certain things that you couldn't do with it, just in the way that it was built, just like in a human skeleton there's certain things we can't do," adds Carlos.

> *"There were certain things you couldn't do with it, just like in a human skeleton"*



The Diplodocus was the longest of the dinosaurs – usually around 27 metres. Much of its length was taken up with a strong whip-like tail. It also had a concentration of nerves in the base of its spine which helped control its hind legs and tail.

⇨

> *"Instead of biting and ripping things, T-Rex just used its mouth almost like a club. It would just barge into stuff with its teeth out"*

was attacking something you had to be really over the top and mean and vicious. The T-Rex had these crappy little front arms that didn't do anything, so all the palaeontology guys were saying that it attacked things with its mouth. Instead of biting and ripping things it just it used its mouth almost like a club. It would actually just barge into stuff with its teeth out – I mean it probably lost a lot of teeth. It sort of did and didn't work in the end, so we ended up using a bit of a combination of both to get it to look right."

All the animation work was done in *SoftimageI3D*. Once a working model had been fed into the system, it was given a basic system of bones. Puppets (or tags) attached to the bones enabled the animators to put the animals into their basic poses which were stored as keyframes. The software could then do the tweening between the keyframes, and the animations were perfected by manipulating the program's 'F-curves'. The function curves were invaluable for fine-tuning the movement, and as they're displayed as graphs in *Softimage* they enable the animator to analyse the movement if something's going wrong. "The key frames give you the overall broad-brush animation, then you can go in and move the curves to get your final control," says Milne.

Chilling on the set

Getting the main dinosaurs in the series to play their starring roles was one thing – another challenge was keeping the background actors moving when they weren't doing particularly much. This fidgeting is referred to by the animators as 'chill cycles'. "We had to spend a lot of time doing chill cycles, and getting the creatures to do not a lot, which is a really hard thing for animators to do because usually we just work, animate something and over-exaggerate their

movements. We had to set them quite still and get them to do things like scratch or look about, yawn, bark at another one," says Carlos Rosas, the second lead animator on the project.

In some scenes numerous dinosaurs are on screen at once, so Framestore would design one long chill cycle for each species. Each animal was on the same cycle but running at offset times. This saved time and ensured the animals had consistent behaviour but didn't appear to be copying one another.

With the animations complete the dinosaurs could be textured and rendered. Framestore was also commissioned by the BBC to do the post production work, and used *Henry* and *Flame* suites to composite the animations into natural settings shot at locations

Framestore hits

From *Walking with Dinosaurs* to *Alice in Wonderland*, Framestore is behind a string of successes

On top of intriguing and varied television commericals for products such as Dolphin Telecom, Philadelphia cream cheese and Pasta 'n' Sauce, Framestore has enjoyed huge success in the effects industry. In fact, the company has won four prestigious Emmy Awards in the US, cleaning up in the Special Visual Effects category each year since 1996. *Gulliver's Travels* (1996), *The Odyssey* (1997) and *Merlin* (1998) were followed up in 1999 with a brand new interpretation of *Alice in Wonderland*. The latter is available to watch on video in Britain.

Join the mad dance of the lobsters, porpoises and other varied sealife in Framestore's Emmy-winning production of *Alice in Wonderland*.

Pterosaurs: getting in a right flap...

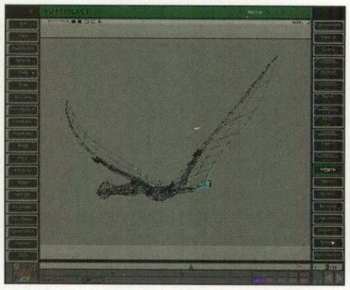
Flying predators were graceful gliders but ungainly walkers

Though birds would seem an obvious contemporary source for Pterosaur movement, the wings of these airborne monsters couldn't stretch as far back and forth as today's birds. Nor could they perform the same, balletic running-and-flapping take-off motion seen in swans. Bats proved to be a closer match, if only because their wings are made of skin like the flying dinosaurs.

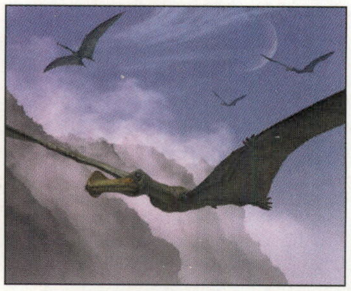
The team worked out that when on the ground the Pterosaurs used their wings to help them move around. So they came up with a system which looks similar to a person dragging themselves along on two crutches – ungainly and primitive. "We took that and also how bats move to get a similar feel, obviously on a much bigger scale, but again we tried to mix the two and came up with that," says Carlos Rosas.

The smaller Pterosaurs were more closely based on bats and birds, mainly because of the similarity in size.

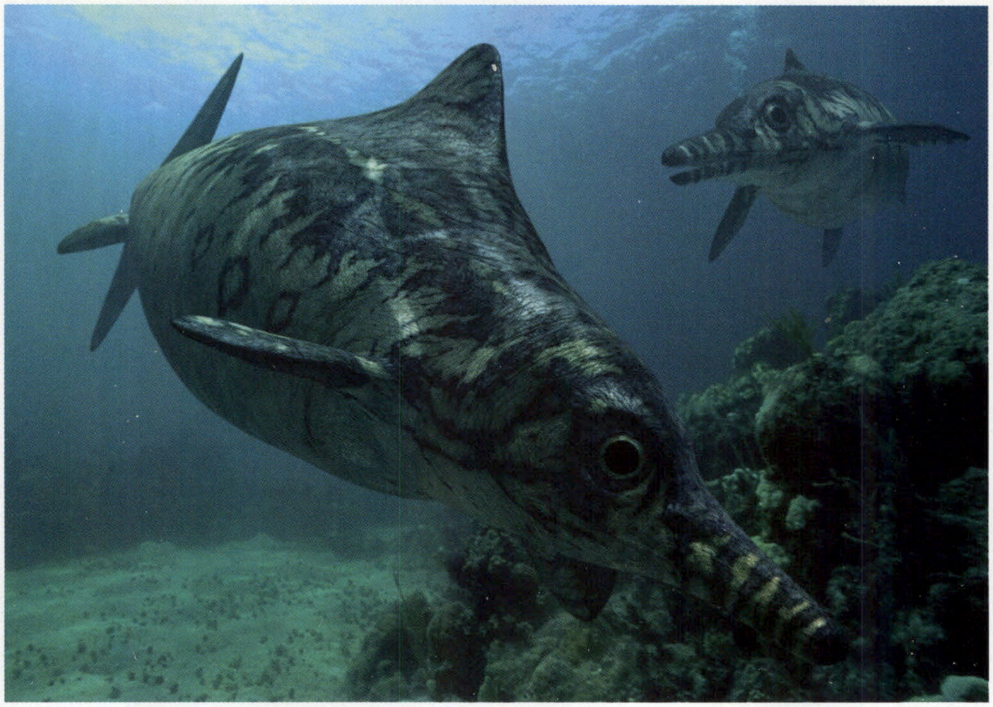
> *"We took how bats move to get a similar feel, obviously on a much bigger scale"*



Here's the Ornithocheirus in wireframe mode. Wing articulation was limited compared to birds.



And here's Ornithocheirus fully rendered and on the wing – probably gliding off to a breeding colony.



The Ophthalmosaurus had a graceful five-metre long dolphin-shaped body. Its almost toothless jaw was adapted for catching squid and fish and it had large eyes too.

around the world. The series' appeal has boosted Framestore's profile, which will be augmented when the series is shown in the States during 2000. Within the broadcast industry it has led to an inevitable increase to the number of calls Framestore is taking.

Release in the States

However by the time the series went on air, the team were already stuck into their next project, *Jason and the Argonauts*. One of the main beasts is a giant dragon, taking advantage of the animation expertise built up in the making of *Walking with Dinosaurs*.

So, where would Framestore improve on *Walking with Dinosaurs* given the chance? For Carlos Rosas, the key issue is the big difference between the quality of the amazing full-body dinosaur animations and the close-ups, most of which used fake animatronic heads rather than 3D graphics. "We can tell there's a vast difference between animatronics and CG," he explains. "We thought initially that we wouldn't be able to do close-ups at all and the CG model wouldn't hold up and the textures wouldn't show up properly. But in the end we could have. We were just saving our arses for close-ups just in case it wouldn't hold up, but we realised that it would halfway through."

Information

For more information on Framestore see **w** *www.framestore.co.uk, or call* **t** *020 7208 2600.*

Animation tips

Carlos Rosas, a lead animator on Walking with Dinosaurs, offers some hints on creature animation

1. Observation is the key. Watch how people and animals move. Even when they're not doing anything they're still moving. You'll be able to make your characters look alive if you can give them a realistic idle mode.

2. When creating the skeleton set-up (the constraint system for inverse kinematics) keep it simple. Otherwise your computer will slow to a crawl.

3. Before animating, plan out what you're going to animate. You could even do a storyboard to plot out key poses you want to use.

4. During animation, block out the key poses for the whole shot first. Then, once the timing is right, go back and add the details later. These details could include things like followthrough in arm movements and secondary animations like the flow of hair, clothing and so on.

5. When animating arms or appendages that don't touch or interact with anything, don't use IK, otherwise it looks unnatural, and you won't be able to incorporate overlapping action.

6. When copying an animation from say, one arm to the other, never leave it at that. Change the animation so that it doesn't look symmetrical and unnatural.

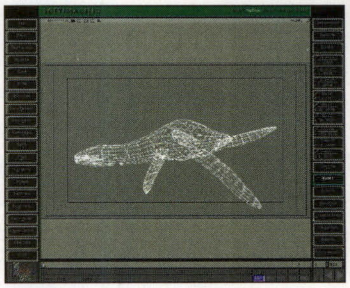
The Liopleurodon: the world's largest ever predator...

A lost form of movement resurfaces on television

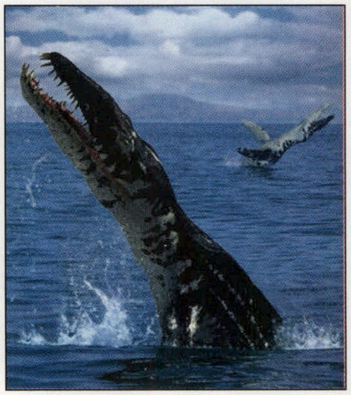
The third episode in the series took viewers to the ocean depths to meet Pleiosaurs like the Liopleurodon. Framestore learned from Portsmouth-based Pleiosaur expert Dave Martill that Liopleurodon swam with alternating flipper movements – when the front flippers pushed down, the rear ones moved up. It's a form of motion now extinct, with the slight exception of penguins and sea turtles.

With flippers shaped like aeroplane wings, downwards slices through the water propel the creature forwards. When tilted back, however, the water pressure pushes the flippers back up again. "It was really successful because once we did apply that principle, we invited Dave up to look at it and I've never seen someone so emotional," says Mike Milne. "Tears in the corners of his eyes, he said, 'I've taught this for years and I've never seen it,' and that kind of reaction was common throughout all the people we've worked with."

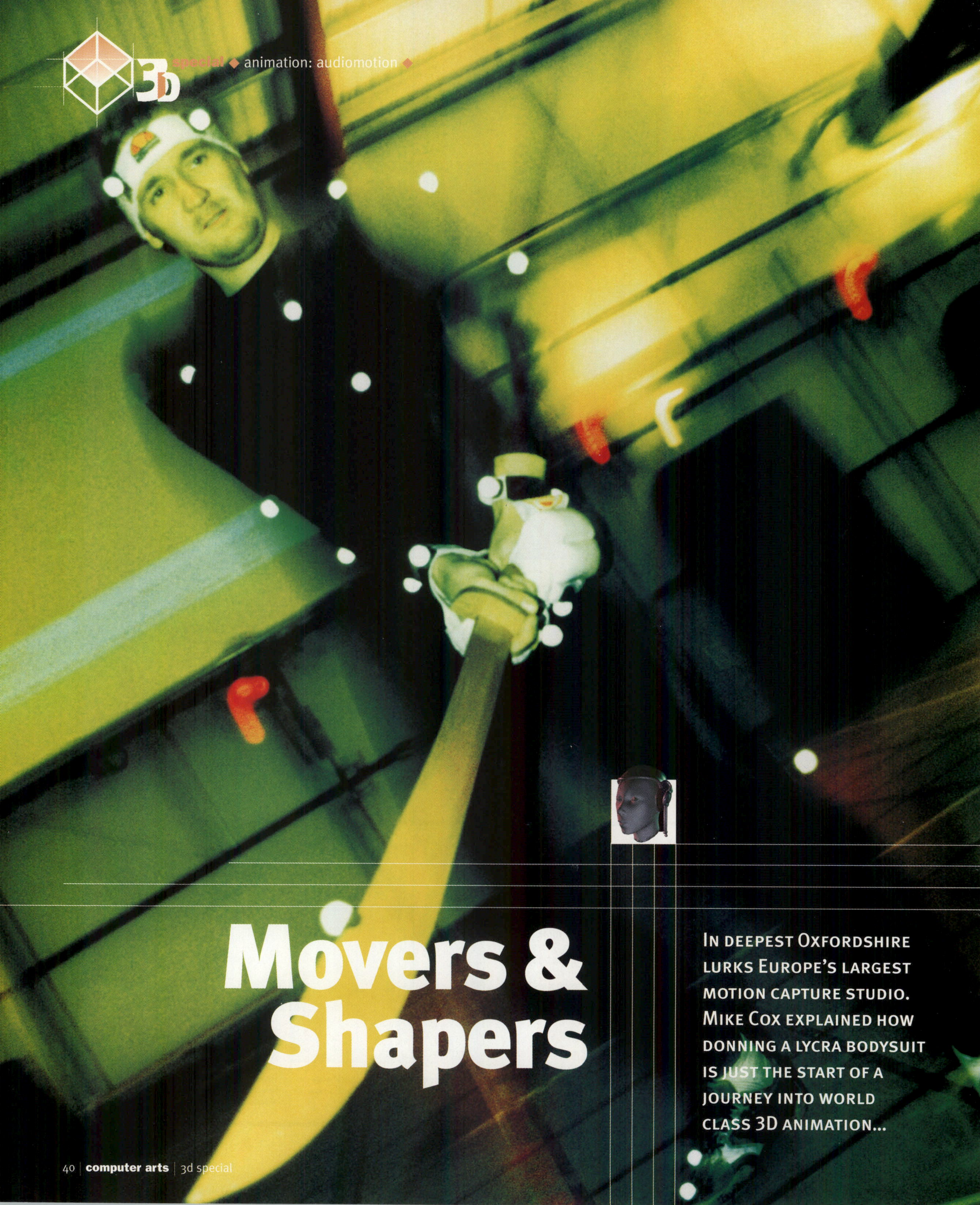
> *"We invited Dave to look at it and I've never seen someone so emotional..."*



Liopleurodon's flippers worked in an alternating form of motion that's now pretty much extinct.



When not tearing flesh from its prey with ten-inch teeth, Framestore reckons these giants of the sea frolicked like whales.



Movers & Shapers

In deepest Oxfordshire lurks Europe's largest motion capture studio. Mike Cox explained how donning a lycra bodysuit is just the start of a journey into world class 3D animation...

Studio Heaven AudioMotion's state-of-the-art motion capture facility

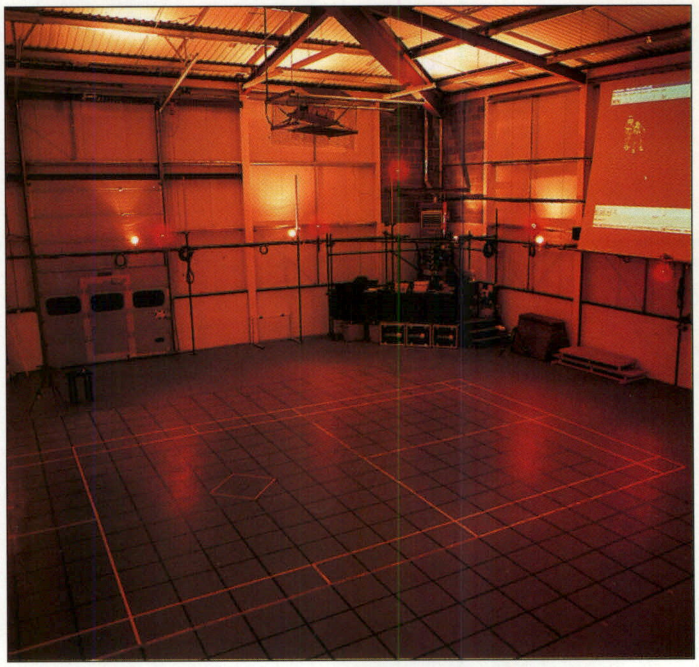
The Vicon 8 17 camera motion capture system is housed in AudioMotion's purpose-built studio.

"This is overkill for this space," says Mike Cox. "We can capture anything in this room past the expanse of that black grid to an accuracy of 0.1 of a millimetre – that's multiple characters. There really isn't anything we can't do. We're having to introduce filters to decrease the accuracy because it's picking up little specks on the floor."

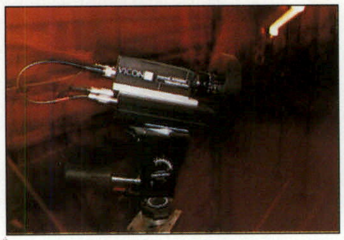
The studio doubles as an area for green screen filming. The screen (top right of the main picture) is used to playback motion capture action to help actors perfect their movements.

It's facial motion capture, however, that's at the real cutting edge of what AudioMotion do: "We believe we're ahead of the world, people from ILM are asking us how we're getting such good results. The reason we get such good results is because of camera overkill."

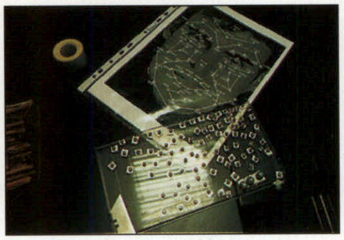
Mike explains how seven cameras are trained on the voice artist. "We capture the audio at the same time," he says, which means that voice and face are never separated." This means there can be no slip, says Mike: "That's always been the problem, that you're only ever as good as your mime artist."



Already the biggest Motion Capture studio in Europe, AudioMotion intends to expand this facility to create an even larger L-shaped capture arena.



17 cameras track every move actors and dancers make within the capture area. They even pick up specks of dust!



These markers are used on the faces of voice actors to record the movement that accompanies every syllable.

It's not all hi-tech, before the animation process begins, storyboards and concept art must be produced.

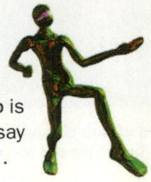
Photography: Gavin Roberts

In the middle of a studio that looks like a cross between a cargo bay and an abandoned film set lies a grid. Roughly the size of a tennis court, it's what occurs in this space that makes AudioMotion a very special animation house. "It's the most powerful motion capture system you can buy, as used by Industrial Light & Magic," Managing Director Mike Cox says of the Vicon 8 17 camera set-up. "I'm very annoyed with Oxford Metrics for not telling me that ILM has got the most cameras in the world at 18, because if I'd known that I would have bought 19!"

Yet a tour of AudioMotion's state-of-the-art facility demonstrates that the firm does much more than just capture raw data. "I think where AudioMotion specialises is in the use of motion capture animation in 3D. We've set up a very advanced graphics team, people who are themselves very good character animators," says Mike. AudioMotion can guide a project through every stage of development from the original motion capture to adding 3D animation and sound before producing a final edit.

Shooting the works

Mike talks through a typical job: "The first stage of processing is where they actually identify the markers and say 'that is on the shoulder, that is on the head', and they also replace any gaps. The next thing we do is join a stick man together and say 'that's where the markers are'.



Icelandic songstress Björk was motion captured for her Hunter video, where the singing pixie was transformed into a polar bear. "We did all the facial capture, the head-tracking," says Mike – not an easy job, apparently, as she was headbanging throughout the shoot.

Once we've finished this stage the data is cleaned and goes into another package like *Kaydara Filmbox*, which is good at skinning the animation that we create. We can take a client's mesh or one that we've created here and map the animation to it."

Creating a virtual body from the motion capture data is only part of the story, however, as producing a human face that moves realistically is the ultimate challenge. AudioMotion's pioneering work in the area of facial motion capture means that the expressions of a voice artist can be transferred, via Beam Software's *Famous* package, on to a face mesh. As the audio and capture data is recorded at the same time, the virtual face can never be out of sync with the dialogue. Mike explains: "Each of these crosses is the position of a marker on the face. You can tweak the areas of influence, from red which is 100 per cent influence down to yellow which is 0 per cent influence. You can affect the way the movement of these muscles affects the movement of the mesh. The muscles that actually control the human face are so complex that you're on a hiding to nothing if you're going to try to emulate them. The best thing you can do is record the physical movement of the skin."

The basic models formed from these two types of motion capture may create animated characters that can walk and talk but without hair, textures and cloth effects they'd just be naked flesh. It's now that the company's rendering expertise comes into play. "Our main package is *Maya* but we have started to use *Lightwave* because it's quicker," says Mike.

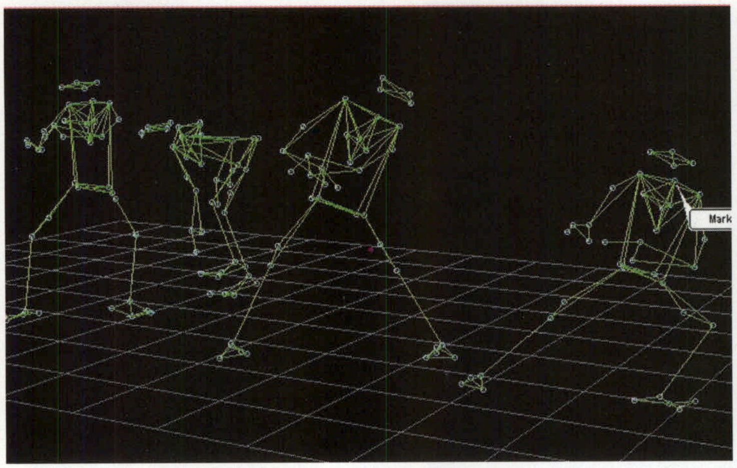
Hardware with an edge

Although the firm has two SGI machines, most work is done on NT. "We chose to go NT because of price performance," says Mike. "I know that very, very high end SGIs have still got the edge but they're £100,000 – they can keep the edge." The NT route does have hidden costs, however. Mike describes *Maya NT*'s lack of distributed rendering as "a crime". He says his animators have to use the firm's render farm (racks of slave units boasting dual 450MHz PIIIs) instead: "It's a nightmare, what actually happens at the moment we call 'praying at the altar', the guys have to walk downstairs, open up the cupboard and set the renders on each of those CPUs!" The company has employed two programmers to write new software tools, like a distributed rendering package that sits inside *Maya*.

Awkward as it may sometimes be to achieve, the results when AudioMotion's full rendering power is brought to bear are stunning. Mike showed us several long-term projects including the creation of a virtual pop band and a new ride film that will be rendered up to IMAX resolution (at this spec even the straps on a character's ski boot must be perfectly modelled).

While these bigger projects are keeping one side of the business ticking over, AudioMotion will still be marketing itself as a TV and pop video producer. Past credits include 3D animated series The Alphabees and Manic Moonsters, work on pop promos

The company's first foray into the world of pop videodom was this effort for upcoming band Dope Smugglaz. The group wanted a totally surreal look, according to Mike Cox: "We did the whole job in two and a half weeks for £11,000."



AudioMotion uses motion capture technology developed by local boys Oxford Metrics: "The Vicon system is at the high end of optical motion capture," says Mike Cox.

The director of a promo for boy band Northern Line wanted the band to be accompanied by a glass backing group, having got the idea from the BNFL chrome figure.

for Bjork, Dope Smugglaz and Northern Line. "One of our strengths is that we can do everything under one roof," says Mike. "A client can come here with nothing – this happens with pop promos – you will get a director and perhaps the artist turning up and they'll have no ideas – a budget, a deadline and that's it. They'll walk away with concept art, a storyboard, a quote and a deliverable date."

The right location

It may have been a handicap back when AudioMotion was founded in 1997 but its Banbury site gives the firm enormous flexibility. "The guys in London are always pressed for space… we've got the space, we can be versatile," says Mike, pointing out that the motion capture studio doubles as a green screen studio for shooting stars like Michael Owen for FMV in the videogame *World League Soccer 99*. Now that the most games publishers are creating their own FMV the firm's future is more closely intertwined with the world of pop music: "We found that a typical pop promo budget would be 30, 40K. Now you've got options, you can take the band out on location and film it – well that's blown your 40K straight away…" For the same money you can have a cartoon world rendered in *Lightwave* or a futuristic stage that explodes to reveal a backing group of living glass characters.

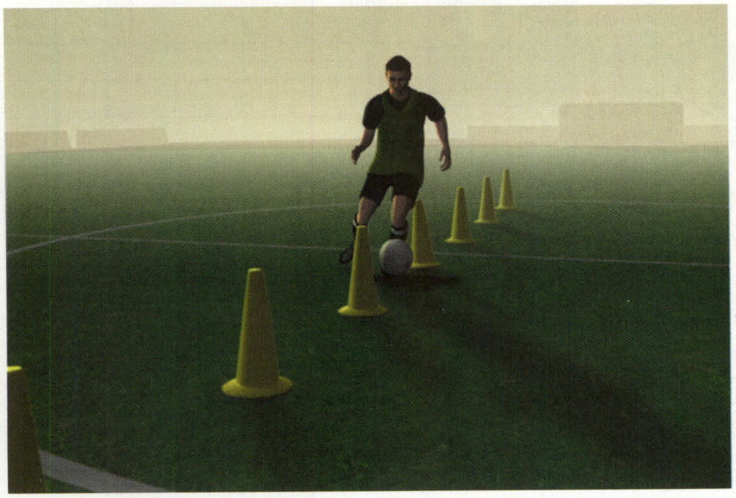
The next year is going to be a busy one for AudioMotion's 40-strong staff of animators and editors. The firm has already pitched to do the CG part of a possible *Thunderbirds* movie and is close to signing details on two big TV projects. The relentless pursuit of ever more detailed, ever more realistic backgrounds and characters perfectly composited together means that no-one can afford to stand still. On the day of our visit the editing team were getting to grips with a new Quantel compositing system.

While the firm's programmers are trying to come up with quick-fixes for today's technical problems Mike admits that the animators have to rely on Intel bringing out faster processors every year – without this constant speed boost they simply couldn't afford to render the models that they are currently building.

According to Mike, however, technology alone isn't enough: "There was always a fear that motion capture would make animators redundant but you will not get usable results out of motion capture unless you know about animation… I don't think motion capture works if you don't know what to do with it."

Turn the page to find out more about how to import motion captured data for your animations. ca▸s

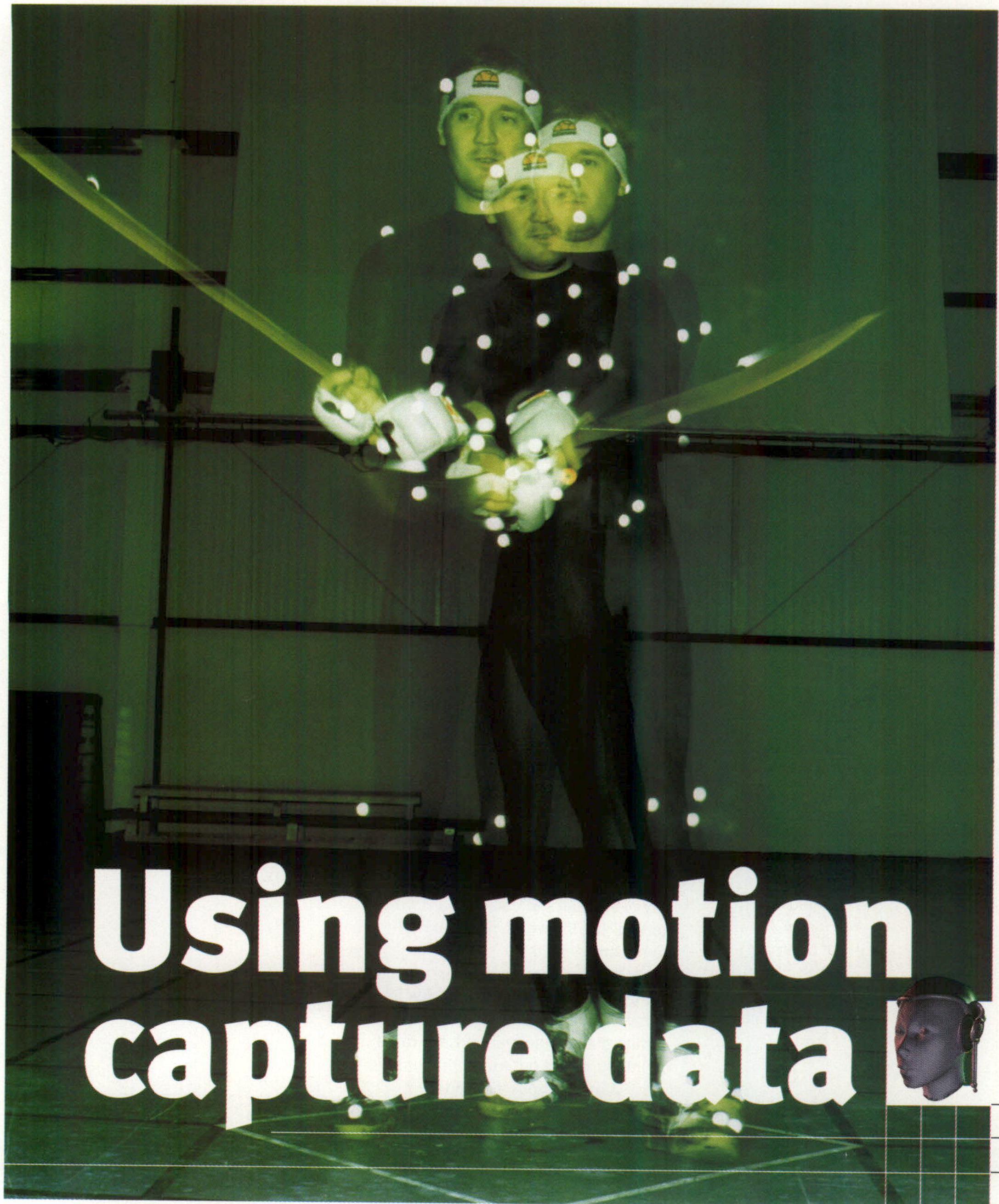
> *"With pop promos you will get the artist and the director turning up with no ideas. They'll walk away with concept art, a storyboard, a quote and a deliverable date…"*



AudioMotion's studio has seen a host of stars visit to be virtually modelled. Michael Owen was captured for *World League Soccer*, as was Robbie Williams for *FIFA 2000*.

Information

If you want to know more about AudioMotion
***t** 01295 266622, **f** 01295 266685 or go to*
***w** www.audiomotion.com*



Using motion capture data

Richard Hince, Motion Capture Manager at AudioMotion, reveals a few tricks of the trade...

Over the next two pages we'll be taking a look at the basic methods you can use to apply and execute motion-captured data in computer graphic packages. Obviously it's impossible to cover every single aspect in great detail, but the information provided here should at least give you a good grounding in the basic techniques. So strap on the bodysuit and standby for action – welcome to the world of motion capture...

Things to consider

The first thing to understand is that motion capture is not the same as traditional hand animation. Many people believe motion capture doesn't work – it does, and used correctly it can produce the most realistic animation available. Bear in mind that motion data is recorded from the real world, and it's going to do whatever the actor did. This is in complete contrast to traditional animation, where we make the data do what WE want. Once you understand the idea that the character mesh and skinning techniques can be modified to suit the data (rather than the other way around), the whole task becomes much more manageable.

Import and export of motion capture data

Usually, the decision on which format to use will be dictated by the import and export options available. If you are getting your data from a good bureau, then a number of formats will be on offer. Opinions differ regarding the best approach to apply data, so it's hard to recommend a specific format. The approach many bureaux now prefer is to apply the data to the client's models from the outset, providing a complete trouble-free set of animations. However, many users prefer to apply the data themselves, and we'll briefly tackle this subject later.

Basic data representations

Motion capture data arrives in two forms: hierarchical, and trajectory. The former consists of joints and/or bones creating a skeleton for a human or other geometry, and the latter is a series of x, y and z points for each of the captured elements (usually markers) over a series of frames. Data from magnetic systems will also contain the x, y and z rotations of the sensors, and is basically an extension of the trajectory case – the application techniques are similar.

Common formats for hierarchical data are BVH and Acclaim. For trajectory data, CSM (intended for import into *Character Studio 2*) and TRC are well known and widely used, but there are many others.

Trajectory data

If the data is delivered in a trajectory-based format, the animator must find a way of

> **"Motion capture is not the same as traditional hand animation. Many people believe motion capture doesn't work – it does, and it can produce the most realistic animation available..."**

mapping the data to the character and using it to drive the skeleton/hierarchy. Typically, this will be through the use of whatever IK functions the package provides (*Maya* and *SoftImage* are well catered for in this respect). Bear in mind that we will rarely be able to use the data exactly as it was captured. To make it 'animation-friendly', we must estimate the joint centres of the actor, since the markers or measurement devices were placed on the outside of the body and not on the inside.

The estimation of the joint centres must be done using either a) geometric manipulation of the captured data using that package's expressions editor or b) creating a rigid body controlled by three or more marker points (from the waist, for example, when estimating hip joint centres). It depends on your package's facilities.

Characters animated by hand are well-behaved. Those animated with motion captured data often are not – a leg constrained with IK, for example, will be constrained at the hip and the ankle, and when animating this by hand the hip position can be modified to accommodate fixed length bones. Motion-captured data simply follows the action, hopefully in an accurate way. However, the accumulated effects of inaccurate joint centre estimation, skin movement during the capture process, etc, will result in differences in bone length between hip/knee and knee/ankle (the hip-knee length changes being the most pronounced) under certain conditions.

If we are using motion data to constrain the two ends of our IK chain, therefore, there will be situations that arise that cause the legs/arms etc to be stretched beyond their limits, introducing problems such as violent leg and arm snaps. The techniques used to estimate joint centres can be fine-tuned to minimise these effects, but there are two ways to overcome this problem. The first is to make the limbs slightly longer than they should be, so that this problem is rarely encountered, animating out those instances where it does. This can make the limbs look odd, so exercise caution. The second is to reduce the snapping effect by putting dampeners on the affected limbs so that the snaps are less pronounced when they do occur.

Combinations of these techniques can give good results – in the end it's all down to practice.

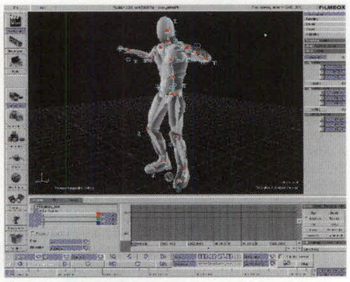
Hierarchical data

When provided, hierarchical data has already had the basic data applied, as we described above. The problem you're most likely to encounter is that the skeleton and your character design don't match proportionally, leading to the need to scale the skeleton in one or more places.

Scaling of hierarchical data can lead to the inexcusable 'sliding feet' problem, so often seen in motion-captured animations. Whatever the data source, it should never be allowed to make it to the product. Foot slip can be corrected in many ways – using floor constraints to fix feet during foot-floor contact periods, for example.

Assuming you have scaled the data successfully to match your character design more closely, the choice of methods to get the animation to work is clear: either re-skin your character to the data set, or copy the rotations from the motion captured skeleton to your own.

A fully-rendered *Maya* shot showing a frame from a demo, *Swing Kids Dance*, which featured motion capture and *Maya Cloth* dynamics.



Trajectory data from multiple characters as it would appear immediately after it's been captured in *Vicon Bodybuilder*.

Character modelling for motion capture data

The most difficult problem to overcome when skinning characters is that of joint rotations in areas of high mesh complexity. The shoulders are probably the worst case – hierarchical data normally places all of the upper arm axial rotation at the shoulder joint, and this will often destroy the skinning methods currently used in this region. In cases like this, a good approach is to subdivide the axial rotation of the upper arm between the shoulder and the elbow, removing it from the shoulder completely.

This way we will only have to deal with two degrees of freedom. However, a further joint will be needed between the shoulder and the elbow – exactly where this is placed is not critical, but it allows the upper arm rotation to be placed in a less problematical position. Similar techniques can be used elsewhere in the mesh where required.

The best possible approach

AudioMotion uses a variety of techniques, including specialised software and geometric modelling of data before it even reaches the graphics package. A description of these – besides being commercially valuable – is outside the scope of this article. But there are some commercially available packages that we do use and which we recommend to potential motion capture users.

Filmbox from Kaydara is the 'rising star' of motion capture editing and mapping packages. It will accept data from any system or device, map the data to your character in a variety of ways, and export the result to all major packages. *Famous Faces*, from Famous Technologies is aimed at facial capture. This also imports from and exports to various different sources, making it a very flexible package. ca>s

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Edge Thresh
Center Thresh
Maya 1.5

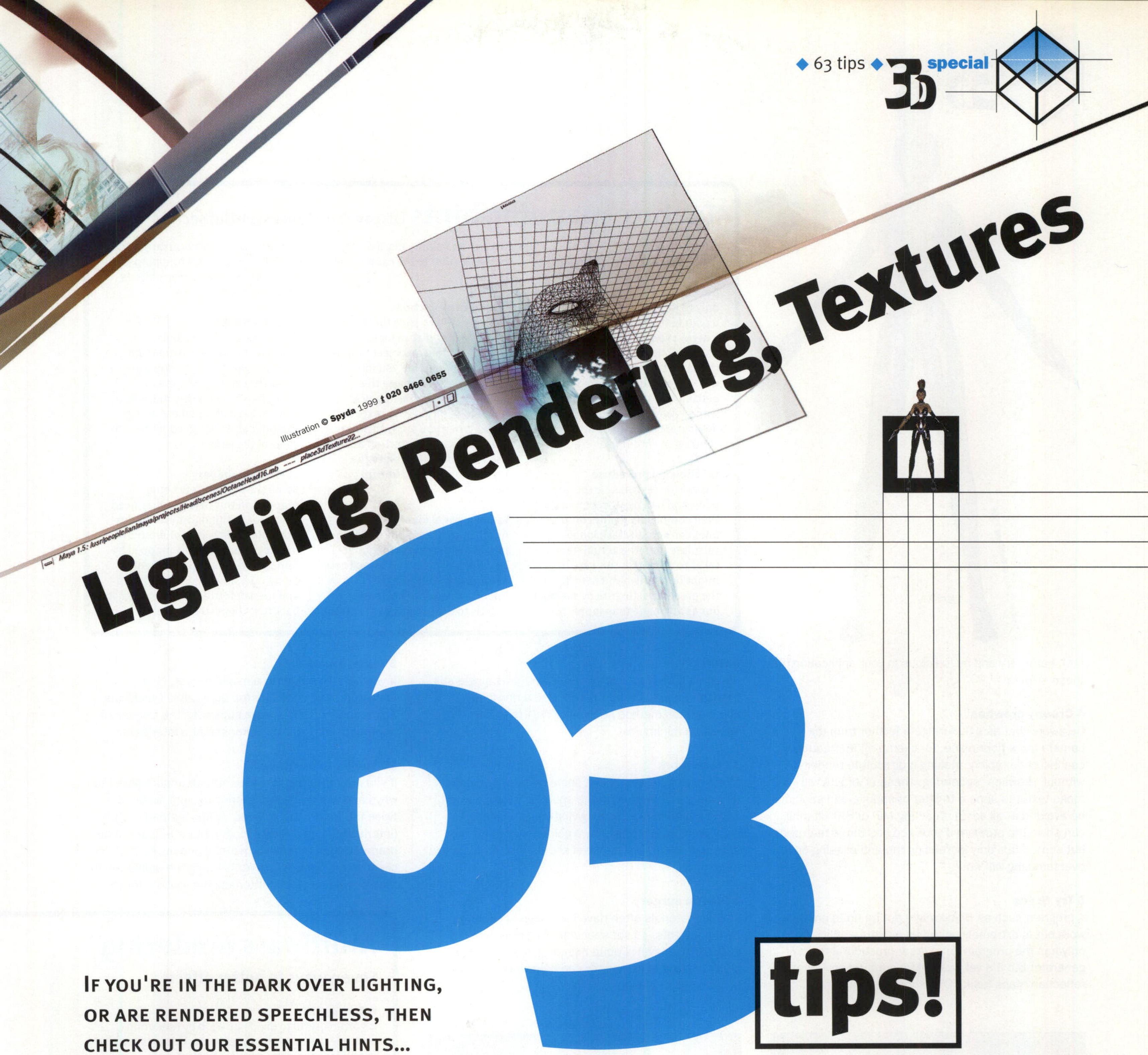
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Illustration © Spyda 1999 ☎ 020 8466 0655

Lighting, Rendering, Textures

63 tips!

IF YOU'RE IN THE DARK OVER LIGHTING, OR ARE RENDERED SPEECHLESS, THEN CHECK OUT OUR ESSENTIAL HINTS...

Whether you're a raw beginner or an accomplished 3D maestro, there's nothing like a bit of insider knowledge to help make life that little bit easier. To that end, we've assembled the choicest hints and shortcuts, with time-saving suggestions aplenty.

We've split the tips into three broad sections for easy reference – rendering, lighting and texturing. In addition, we've taken a closer look at the secrets behind successful multipass rendering, texture mapping and shadows. It doesn't matter what 3D package you're using, or if you're on Mac, PC or SGI, most of these tips can be applied across the board. So what are you waiting for, just dive in...

Rendering

1 The master plan
Save hours of work by planning out your animation or still renders. Make sure you have all the models and textures you need and don't waste time creating details you'll never see – this will save you more time than any render optimisation.

2 Unnecessary effects
Even with today's speedy processors, it still makes little sense to use expensive raytrace rendering effects when they aren't necessary. Most of the time a well-constructed environment map can be used in place of raytraced reflections, and always ask yourself whether raytracing your scene will really make that much difference.

3 Quality control
It's often thought that raytracing means higher quality but this is not necessarily the case. There are as many (if not more) poor quality raytrace renderers as there are great ones. Raytracing snobbery will lead to only one thing. Longer renders.

4 Ray of light
Having said that, there are times that only a raytracer can cut the mustard (3D motion blur, true refraction ⇒

Dark Mistress © Bullfrog 1999

Texture mapping hints Discover our six essential secrets

11 Perfect skin
Creating good skin textures is tricky, but essential. What's the point of executing a detailed model only to lose the realism because of a poor texture? A good tip is to use a decent specularity and bump map which should be derived from the same texture file so they line up on the model. A simple way of getting skin texture is to scan some, preferably your own, then desaturate and whack up the contrast in *Photoshop*.

12 Following procedure
Procedural textures can be good news and bad news depending on their complexity. Really complex ones can actually take longer to calculate than the actual frame takes to render! In this case it might be a sensible idea to 'flatten' the procedural texture by saving it out as an image map (apply the texture to a plane-aligned perpendicular to the camera and render it).

13 Plug-in projection
Plug-ins are available for some 3D packages (*Lightwave* for example) that can unfold an object based on a texture projection you intend using. You can then use this unfolded wireframe image as a guide to painting your texture maps. When you apply the map using the same projection as was used to unfold the object, the texture map should line up perfectly!

14 Orthogonal views
Another great mapping technique involves rendering orthogonal views of an object and using these as guides in *Photoshop*. It is important to crop the image exactly to the extents of the object in the view, then you can apply the texture using Planar mapping and 'autosize' the map to the object's extents for a perfect fit.

15 Alpha masks
Alpha masks can be used to combine multiple texture maps on a single object surface. You can use *Photoshop* to precisely create overlaps where texture maps butt against each other on the object. Irregular alpha mask edges help to conceal the join.

16 Problem shapes
Some shapes will defy being mapped. In this case you may need to approach things differently. For example, an object bent around itself can be accurately mapped by remodelling the object unbent, applying a simple cylindrical map and then deforming or morphing it back to its bent shape.

etc), but be try and be judicious in your application of these effects.

4 Creepy crawlies
Be aware that as a texture gets further from the camera (on a floor plane, for example), its frequency can increase rapidly, making it difficult to render without 'crawlies' appearing. These artefacts will make textures appear to jitter or sparkle and should be avoided at all costs. Enabling MIP or SAT filtering can solve the problem if your app has these featured, but sometimes only increasing the anti-aliasing or oversampling will work.

5 Try *Bryce*
A program such as *Bryce* might not be up to pro level work but is extremely useful as a texture utility. Not only has the program got a great procedural texture generator but it's very useful for creating environment reflection maps (using QT panorama rendering).

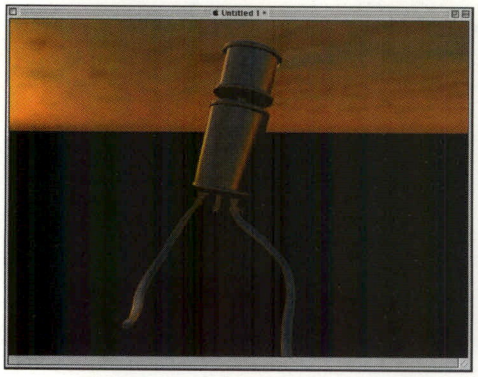
6 Still life
It's usually best to output a final render as single still frames sequentially numbered. Use a non-lossy compression method such as LZW Tiffs to keep file sizes to a minimum.

7 Metal work
Metal materials often have some percentage of their diffuse colour present in the specular colour as well. Some apps handle this by giving you a 'colour highlights' switch or simply a colour swatch for the specular colour. Diffuse level should also be quite low for a metal.

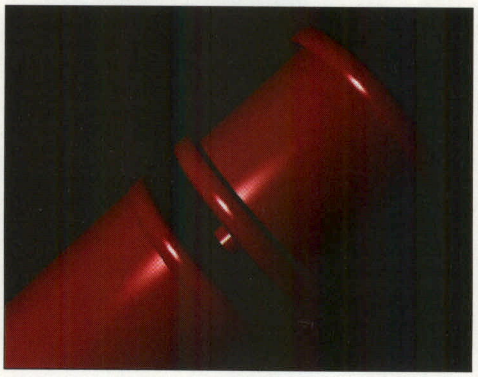
8 Plastic surgery
Plastic materials often have low levels of colour in their highlights, so set specular colour to white or grey. Diffuse level is quite high, or full and often a small amount of luminosity can help when creating some types of plastic.

9 Quick march
If you have to render to a movie format, choose an uncompressed codec for top quality like QuickTime Animation. You can always compress the footage to another codec such as Sorenson at a later date.

10 You've been framed
If you are rendering for video but are unsure about the whys and wherefores of interlacing, just render at twice the frame rate of video, 50fps instead of 25 (interlaced). OK, it'll take longer, but it's better to be prepared than to make a mistake and upset your client with a delay. Whoever is laying the animation to tape should be able to interlace the footage for you.



***Bryce* is a great source of textures to use in other more professional apps. See tip 5 for more details.**



For plastics the specular colour is often white (or grey) and the diffuse level is high.

Multipass rendering

Seven ways to better effects

17 Speedy SFX
It's often useful to divide up a job by rendering multiple passes of the same scene. This is especially useful for producing special effects in a 2D compositing application much more quickly than your 3D application can.

18 The plot thickens
If you're producing an animation then drawing up a storyboard can help you quickly spot any problem areas before you come to them, and it can also let you figure out how to organize any multiple pass renders that may be involved.

19 Depth charge
Effects such as Depth Of Field, and in some cases motion blur, can be achieved or enhanced by rendering out the objects in a scene separately (or in logical groups).

24 Pro power

Quicktime Pro is a great tool that every animator should have, it only costs about £30 and is great for converting footage to different formats. One of the biggest benefits is the Sorenson codec which produces very high quality at minuscule file sizes – ideal if you want to show your wares on-line.

25 Terminal cure

If you find a render has terminated unexpectedly (usually one frame after you decide to stop staring at the screen like a zombie and go home for the night), all is not lost. If you have followed tip 10 you can re-render, from the last fully completed frame.

26 Don't forget

Like *Photoshop*, 3D apps like lots of RAM. Buy as much as you can afford. In fact, put RAM ahead of flashy plug-ins on your 'to buy next' list. There's nothing worse than taking on a job and then getting an 'out of memory' message the day before your deadline. 128-256 MB is a good starting point but the 384-512 MB range is a much safer bet.

27 Out of memory

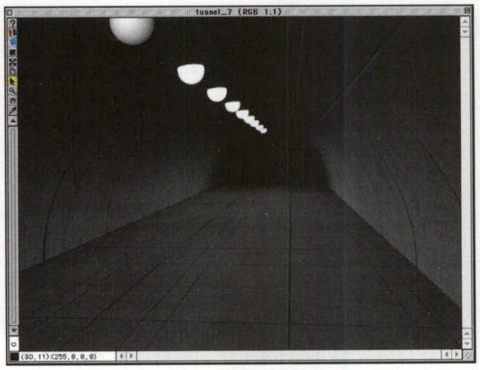
If you do find yourself without enough memory to render a scene, you may get around the problem by reducing the number and size of textures and shadow maps, as these often have to be kept in memory.

28 Test times

You can reduce the time it takes to produce test renders by reducing anti-aliasing levels (or switching it off) and reducing the size of any shadow buffers, er, except when you're testing the lighting, of course.

29 Preview pointer

Most of the time you can preview motion using the lowest quality rendering type, usually bounding box or wireframe. Try to resist previewing with textures and lighting when you're working on motion – it'll look pretty but you'll just be wasting time.



Try adding a random variation to your scene's light intensity and fall-off, it will stop it looking as flat and uninteresting as this image. See tip 35 for more details.

Lighting

30 Negative energy

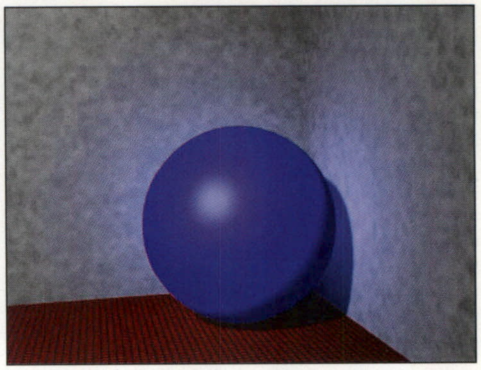
Lights can often use negative intensity values as well as positive values, sucking out light from a scene rather than adding it. This doesn't immediately seem very usable but it is a powerful technique for creating and controlling realistic shading which allows you to 'paint' lighting and control overspill.

31 Drop-off values

Most programs let you define a drop-off value for a light. This has the real world effect of attenuating the light's intensity over distance. Generally, if realism is your goal you should always have drop-off enabled for all your lights (where applicable).

32 Ambient light

Ambient light is a non-directional light that should be avoided wherever possible. You may get away with very low levels for realistic scenes, though high levels can be good for stylised work. Generally, however, all ambient light does is reduce the dynamic range of a render. Yuk.



Placing a radial light with a short drop-off inside the ball simulates the effect of bounced light that normally takes a radiosity calculation to achieve.

33 The great outdoors

Outdoor scenes can also benefit from distant light, but you will also get a lot of diffused light bouncing around. A scene like this is actually a good candidate for using ambient light to reduce the contrast of the shading. Reducing the darkness of your shadows will help enormously too.

34 Light sources

Point lights should be used whenever you want to simulate a point light source such as a candle, lightbulb or an open camp fire, for example. A point light sends out light in a radial fashion equally in all directions.

35 Random access

Try to vary the intensity of your lights. In a corridor, for example, you will rarely find two lights that have exactly the same brightness. Add a random variation (anything from 50 to 200 per cent) to the intensity of any light arrays and vary the colour too.

36 Colour bleeding

Colour bleeding effects can be used to simulate radiosity rendering (for those who don't have the luxury) using special bleed lights placed inside objects. Give the light the same colour as the object and a very steep fall-off. As you move the object (with the bleed light linked to it) close to a wall, the wall will become illuminated as if by light reflected from the object's surface.

37 Shiny bodywork

When rendering shiny objects such as cars you can easily obtain the look you see in so many advertising images by simply creating an overhead light reflector. This is just a large white rectangle illuminated by one or more upwards pointing lights (spots). When rendered with reflections, the bodywork of your car will be blessed with the sumptuous sheen that your heart desires.

38 Forget the flares

Lens flares are often overused in computer graphics imagery. Be careful that you don't overdo it when you add a flare as they can make your work look very cheesy. There's nothing that looks more computer generated than a load of unnecessary lens flares, so be warned.

⇨

20 Divide and conquer

When you *have* to enable time-consuming rendering techniques such as multi-frame motion blur, divide up the rendering task so that only the frames that require the effect receive it. Once your fast-moving object has left the frame, it makes no sense to continue rendering the remaining 120 frames with multi-frame motion blur enabled!

21 Post-render compositing

If you are doing a lot of animation work it is highly recommended to get some kind of post render compositing app. Good choices are Adobe *After Effects* and *effect** from Discreet.

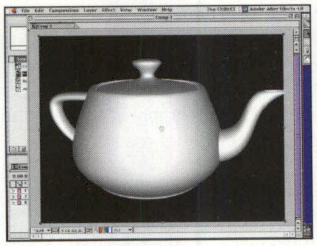
22 In the shadows

Believe it or not, raytraced shadows often take less memory to render than shadow maps. You can render out a separate 'shadow pass' and blur it in a 2D application if you need to have soft edged raytraced shadows (many 3D applications can't do that).

23 Fake Fresnel

If your program does not offer a Fresnel option, you can fake it using multi-pass rendering. Create a pass with 100 per cent reflections and another 'Fresnel mask' pass. To do this, make all objects 100 per cent white and have a single 'Camera Light' (a radial light placed at the camera position). Then use the Fresnel pass as a mask to attenuate the reflections depending on the surface direction.

A compositing app like *After Effects* offers greater rendering flexibility.



Here's the Fresnel pass, reflection pass and the result in *After Effects.*

39 Be Mr sheen

In many apps, lights can only be set to affect the specular reflections of objects and not the diffuse shading (and vice versa). This is useful when you want to add extra sheen to an object, for example a flying logo, but don't want to affect the overall lighting.

Texturing

40 Look ahead

If you plan ahead, you can optimise your use of texture maps. If an object never comes close to filling the frame, then there's no need to make its texture maps bigger than the resolution of the final render.

41 Extreme close-up

Likewise, if you know you will be doing an extreme close-up of a section of an object, make sure that its texture is big enough so it won't pixelate, or you'll get the old standing-too-close-to-the-walls-in-*Quake* look. A dead giveaway.

42 Saving time

Following on from the previous tip, you can apply the high-res map just in the area where the close-up will be and the rest of the object can have normal-sized textures. Weigh up the time it'll take to prepare this to the precious time and memory it'll save you when it comes to rendering.

43 Tileable textures

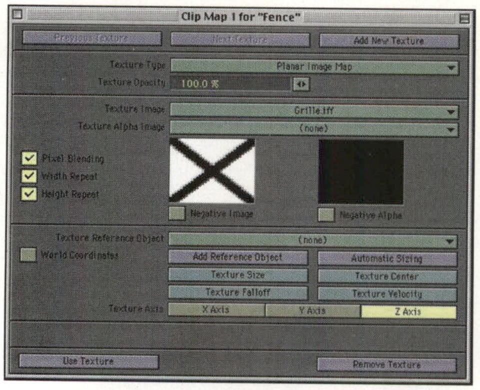
Create tileable textures in *Photoshop* using the Offset command. Offset to exactly half the dimensions of the image map, and then use the clone tool to hide the seams. See page 61 for more.

44 Texture modelling

Textures can be used to model too. When applied as 'clipping maps' they can cut holes in objects, are great for creating fences, wire mesh, metal filigree and other difficult modelling jobs. Clip maps also cast accurate shadows too.

45 Pearl in the shell

Changing the specular colour to something other than the diffuse colour will generally create pearlecent looking materials. Don't stray too far from the diffuse colour for this effect though.



Clip Map 1 for "Fence"

Texture Type: Planar Image Map
Texture Opacity: 100.0 %
Texture Image: Grille.iff
Texture Alpha Image: (none)
☑ Pixel Blending
☑ Width Repeat
☑ Height Repeat
☐ Negative Image
☐ Negative Alpha
Texture Reference Object: (none)
☐ World Coordinates
Texture Axis: X Axis / Y Axis / Z Axis (selected)

Here in *Lightwave* we've used a simple 'X' image map in the Clipping channel to create the holes in the fence. The model itself is just a simple plane.

The shadowy truth

Darkness, depth and illumination

57 Right lights

Be aware of the differences between lights. Generally there are four types: Spot, Radial, Parallel and Ambient. You may get other types such as Tube and Area lights, though these are both point light variants.

58 Cone angles

When using a Spotlight with depth map shadows, the cone angle has a big influence over the quality of the shadow, not just the shadow buffer size. A good tip is to view the scene through the light (most apps let you do this) and adjust the cone angle so that the objects fill the frame. You can get away with much smaller buffer sizes in this way.

59 Space scenes

For space scenes it is customary to use distant light and hard shadows to simulate the light of a nearby star. In space there are no clouds, no light-diffusing atmosphere, just harsh, hard starlight.

60 Under the Spotlight

In many 3D programs, only the Spotlight type can use both depth mapped and raytraced shadows.

61 Beware point lights

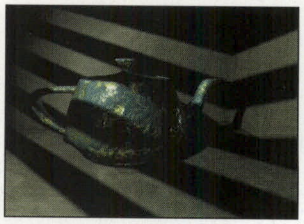
Be careful when enabling shadow maps for point lights. In some apps, what happens is that six shadow maps are generated for each light! If you have a lot of shadow casting point lights you will suffer a tremendous memory and rendering penalty.

62 Quick weather

Movie files can be used too, which is great for simulating rain, windy trees or anything else that you just want to imply and don't want to spend time animating.

63 Get a gobo

A 'gobo' can be used on a light to simulate off-screen scenery that you don't want to model. It is usually a texture applied to a light so that shadows are cast over the scene, the famous example being Venetian blinds.



Adding a texture map to a light can add extra detail to an image.

46 Fresnel explained

As the surface of a reflective object curves away from you, you'll notice that the reflections get more intense. This is the Fresnel effect and should be used for realistic reflective materials.

47 Black and white

It's a good idea to never make objects 100 per cent white or black (unless you are creating effects). You'll never find an object that is 100 per cent white, nor one that's 100 per cent black, in real life. Use 95 or 96 per cent instead.

48 Use textures

Textures can be used instead of models in some cases. Use image maps with alpha masks on simple planes in the background to add detail without the modelling overhead. Set the planes to always face the camera or you'll blow the illusion.

49 Watch the Web

Keep an eye on the World Wide Web. Every so often a great texture resource comes on-line, so why not use it? Recently a 3D production company that went under posted its entire texture library on-line free for all to use!

50 Grab that camera

Scanning the textures of objects directly is a great way to build up a library – and it can be a lot of fun – but it doesn't always work as well as it should. Sometimes photographing an object and scanning the print produces better results.

51 Snap away

A digital camera can be a superb tool for capturing textures quickly and easily. Need some rusted metal in a flash? Take a trip to your local scrapyard and snap away. Looking for a unique bit of bark? Go down to the park.

52 Don't need digital

If you can't quite afford a digital camera (you'll need to get one capable of high resolution for textures) then go the traditional route. A good quality SLR can be had for about £80 second hand, and a scanner can be bought for as little as £50. The quality will often be better than a digicam too!

53 Recycling maps

You can keep texture map usage to a minimum – and thus save on memory – by reusing the same map in different ways. Bump maps and specular maps can often be the same image map, for example. Internally the 3D program will just use the same map stored in memory at render time.

54 Rough stuff

Rough objects can still be reflective, but simply enabling reflections for the objects will produce a sharp reflected image which won't look right. Many 3D applications allow you to pre-blur the reflected image or map, which is what a roughened surface would do in real life. If you observe the real world carefully you'll find that only mirrored surfaces produce perfectly unblurred reflections.

55 Right mapping types

It sounds obvious, but use a mapping type that most closely represents the shape of the object. It's not always obvious what that is, however, though complex objects can often be broken down in to more simple shapes and mapped.

56 Precise pinning

UV mapping will pin a texture precisely to the curvature of a surface and makes it easy to apply a texture to an irregularly shaped object without smearing. To a texture, a surface with UV co-ordinates becomes a flat pane, and we all know how simple a plane is to map! ca•s

In association with computer arts EDGE

European Junior Animators award 2000

GET ANIMATING AND SHOW OFF YOUR SKILLS TO THE PROFESSIONALS...

Gaining employment in the animation industry without the skills and experience is difficult. Now in its third year, the European Junior Animators Award is offered by a partnership of key industry players, with the aims of encouraging new animation talent and placing the outstanding candidates in work. Previous winners Rob Allman and Faraz Hameed are now at Mill Film and King of the Jungle respectively, providing an inspiration for those considering entering their work for this year's award.

Demonstrating their commitment to improving the skills and standards within the animation industry, Avid *Softimage*, Future Publishing, Metro New Media and Dragonhorse have teamed up to act as partners for the European Junior Animators Award 2000. A panel including representatives from these partners and industry professionals gathered by Dragonhorse will be looking primarily at the pure animation skills demonstrated in submitted showreels, although design integrity, originality, conceptual skills and direction will also be taken into consideration.

This selection procedure functions as a valuable showcase for those who have submitted work – in the last two years the panel has comprised of industry professionals from Myths and Legends; The Mill; Jim Henson's Creature Shop; Soho 601; Aldis Animation; Psygnosis; BBC Pebble Mill; Cinesite; Red Post Production; 4:2:Video Graphics; PMPP and Skaramoosh among others.

From these selection sessions, five finalists will be chosen including one overall winner and one runner-up. The finalists will be invited to the *Computer Arts* Star Awards in September 2000 where the award will be presented and finalists' showreels screened in front of some of the top names in the industry.

The award is open to junior animators with some experience of 3D animation (in any package). You are ineligible if you have been employed as a 3D animator for two years or more or if you have a *Softimage* licence in your name already.

Information

*Please contact Metro New Media on **t** 020 7729 9992 or **e** animators@mnm.co.uk for an application form. The award site is at **w** www.mnm.co.uk*

The prizes! The award winner will receive an impressive prize package

- *Softimage* 3D license and 3D animation software and a workstation
- A place on the Metro New Media Softimage Junior Animators course at the company's Shoreditch training centre
- Representation by Dragonhorse

The runner-up will receive

- A place on the Metro New Media Junior Animators course

- Three other outstanding finalists will receive discount vouchers redeemable against *Softimage* training at Metro New Media; *Softimage* goodie bags and a year's subscription to Computer Arts.

Competition Rules

1. People with a *Softimage* licence in their name and/or have been working in high-end 3D animation for two years or more are ineligible.
2. Entrants must be over 18 years old, available to take up the award when presented, be a permanent resident in Europe and be able to provide own travel and accommodation where necessary.
3. The award is not open to employees and relations of the Award partners.
4. No cash alternative will be offered.
5. Submission of entry will be taken as acceptance of the rules.
6. The judges decision is final. No correspondence will be entered into.
7. If you would like your showreel returned please enclose an SAE.
8. The terms of the award are governed by English law.
9. The closing date for submissions is 31 July 2000. Submissions arriving after this date, or arriving without the application form may not be considered.
10. No purchase necessary.

Architectural Visualisation

PRODUCING DETAILED MODELS FOR THE CONSTRUCTION INDUSTRY IS BECOMING AN IMPORTANT PLANK OF MANY 3D COMPANIES' WORK. MEET THREE OF THE FIELD'S EXPONENTS...

Various projects carried out by Visualize (top right) and Axiom. Compositing 3D models into real world environments is a vital part of the visualisation process but can be difficult to get right.

It's still a niche market as far as the 3D industry as a whole is concerned, but the field of architectural visualisation is an expanding one. Companies are doing fierce battle – both the major players such as Discreet, whose *3D Studio Viz* was split off from the main *MAX* product line two years ago – and the smaller, specialist players, such as Informatix's well-regarded *Piranesi*, and a whole host of dedicated package and plug-in manufacturers.

Meanwhile, the companies actually commissioning the work are becoming smaller – even down to the estate agent and surveyor level in some cases – with the 3D architectural model becoming ever more ubiquitous.

"A couple of years ago, spending a lot of money on architectural visualisation was viewed as a real luxury for anyone but the largest practice or the largest client who happens to have an in-house architectural department," says Real-Time Visualisation's Tony Prosser. "It was difficult to get that sort of work off the ground to the level that we do at Real-Time."

Business class

Times are changing. Prosser estimates that nowadays, 25 per cent of Blackpool-based Real-Time's turnover comes from the architectural side of the business. He splits the market into two distinct camps – the sales and marketing side, and the design and approval one, where fine detail is crucial as clients make material and colour changes. "We don't just do a guttering system," he says. "We do the brackets and the fixings, going into a much higher level of detail to strive towards achieving an image that is as realistic as we can make it."

Approaches to achieving that level of realism vary across the industry, depending on client, budget and final use. There's little consensus on software, although it seems that generic 3D packages are used as much, if not more, than those targeted specifically at the market. These tend to be relatively low level too. Real-Time uses *3D Studio MAX*, while the two other ⇒

I talk to the trees

Architectural visualisation branches into a whole new area of expertise

"Natural forms and objects always cause problems," comments Visualize's Stuart Rowbottom, "and that's where, with mid-range software, you're going to trip upunless you spend time making these things look real."

Nowhere is that more true than with trees. While not quite the bête noire of architectural visualisation, they are a distinct problem area and one that many companies have to work hard at to overcome. Undoubtedly the best method of deploying them is to create genuine 3D ones, using polygonal branches and actual geometry for leaves. That's an expensive way of doing things, though, both in terms of time and file size, so their use tends to be limited to foreground objects.

Simple opacity maps with a bitmap image are a frequently-used alternative. They render much more quickly for a start, but the bitmaps tend to have a noticeably different pixel quality and rarely fool the eye, so they're really best placed in the background.

Trees can give architectural visualised scenes a highly effective touch of reality.

Then there are the specialised alternatives. "One of the few plug-ins we use nowadays is *Real-Trees* from ArchiSoft," says Real-Time's Kerswell. "This allows us to draw on a vast library of different trees that render in very little time and add very few polygons to your scene. The disadvantages of this particular plug-in are that you can only effectively view the trees form a low camera level, which means when we use this we have to plan the animations accordingly."

> "Clients all watch too much TV, go to the cinema too often and think they're going to get Star Wars by next Friday..."

companies featured here, Axiom and Visualize, use *Strata Studio Pro* and *Lightwave* respectively. What is uniform, however, is the hollow laughter you receive at the merest mention of 2D/3D linkage. While on paper it makes enormous sense to import CAD data directly into 3D packages – and indeed some companies highlight it as a major selling point of their software – the reality is very different.

"I think I'd rather have a large drawing and run down to the bureau and get it scanned in at 72 dpi for £15, it's going to save me so much time," says Axiom's James Rothschild witheringly.

The problems are many. Architects' drawings are often incomplete or in a less than perfect state, and in translation from CAD to 3D, data often gets garbled – sometimes to the extent that it takes longer to fix than it would to trace over a scan in the first place. By building it from scratch, the 3D people have full control over the integrity of the data – and that's the way they like it.

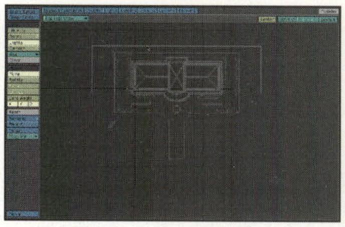
Rothschild estimates that projects have usually taken around two weeks to complete from start to finish, and still do, although he adds, "Clients all watch too much TV, go to the cinema too often and think they're going to get *Star Wars* by next Friday".

Time after time

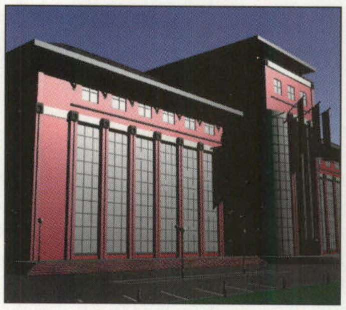
"One week of it is physically building the model," he says, "of which a day and a half would be simply getting the CAD drawings or the printed dyeline drawings into the modelling software. Rendering now doesn't take long at all, it's down to between four and

Building sights

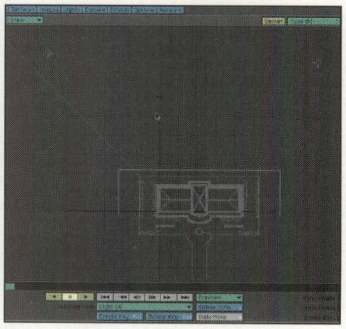
Visualize's Ben Bancroft guides us through a *Lightwave* tutorial – the files are on the CD



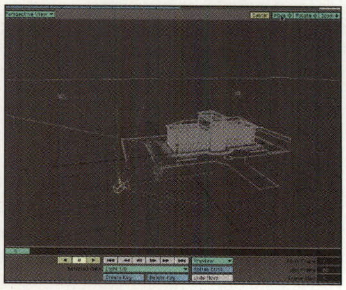
1 Import the Building.lwo and Trees.lwo models into a new *Lightwave* scene. First we will set up the lighting to create a clear daylight scene. Set the ambient intensity to 0 (turn off), as this tends to flatten and wash out the render. Set the default light to a distant light with an intensity of 200 per cent to simulate the sunlight. Place this light so that the light falls on the largest face of the building.



2 Complete a test render with the shadows activated. As you can see the scene is very dark. The shadow areas are almost completely black with no definition. This is because we have not simulated the daylight ambience that exists in the real world.



3 Add two spotlights with a wide cone angle and position them as shown above at about twice the height of the building. Set the light intensity of the spotlights to 20 per cent and turn shadow casting off.



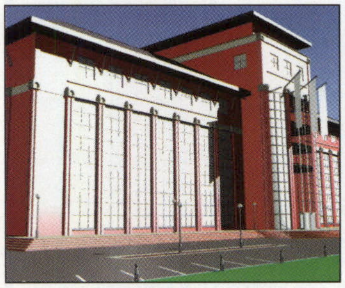
4 Add a third spotlight , name it Ambient Controller and turn off shadow casting. Place this light low to the ground as shown above, to simulate the reflected light from the ground. This helps to define the darker, shadow areas. Creating softer shadows with greater realism.

More architectural visualisations from (clockwise) Visualize, Real-Time and Axiom. The process does present several challenges, such as natural features like water and trees, while lighting can also present headaches when generating interior scenes.

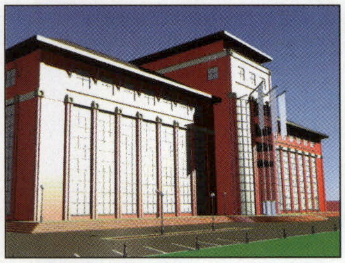
eight hours depending on how many machines you've got. *Photoshop* after that is probably three days. Then there's interruptions and things that go wrong that takes up the rest of the time."

Architectural modelling does throw up certain challenges, however. Natural features such as trees (see box left) are one obvious problem area, as is lighting, especially when you're building interiors or trying to composite a 3D model into photographed terrain (use light from a single source and try and make textures look weathered, is Tony Prosser's advice). As for water features, they remain a headache, as with 3D in general.

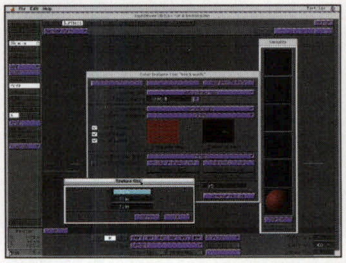
Textures are the key throughout. As Real-Time's Steven Kerswell puts it, getting them right makes the difference between a stylistic image and a photo- ⇨



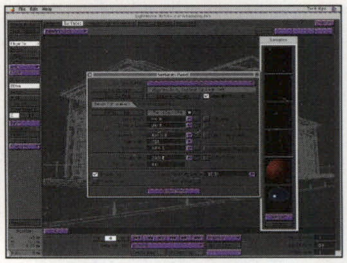
5 Complete another test render. The image now has better definition in the shadow areas but it is still lacking in realism. This is due to the harsh white lighting. To create atmosphere and depth within the scene, colour must be added to the lights to simulate natural daylight conditions.



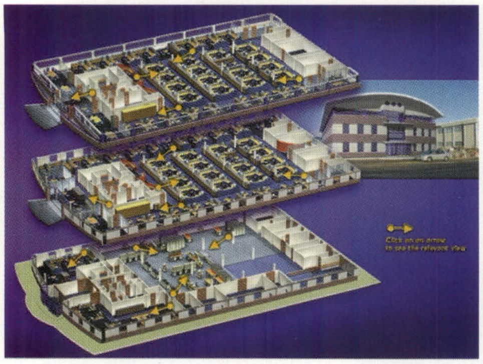
6 Add a light yellow colour to the main sunlight and a light blue to the remaining three lights. This yellow colour in the sunlight simulates the warmth created by the sun, while the blue colour simulates the reflected, ambient light that is produced by the atmosphere. Now complete another test render.



7 Now that the lighting is set up we can texture the surfaces of the model. When rendering architectural visualisations, the scale of the bricks *must* be in proportion to the size of building. Apply the brick.tga texture to the walls of the building with a texture size of 1.32m square as a cubic map, for this image map.



8 Creating a convincing glass surface is also an integral part of architectural visualisation, especially on this type of building. Set the glass colour to a 50 per cent black a with a low diffuse, high specular, high glossiness and a reflectivity of about 35 per cent. Transparency is set low at 20 per cent to simulate the effect of mirrored glass. ⇨



Three-storey architectural visualisation from Real-Time, illustrating the level of detail now possible.

realistic visualisation. "The software used generally provides a built-in material library," he says, "but while being a good starting point, this tends to lead to everyone's work having the same software-oriented feel, as opposed to work that is driven by the artist. Architectural textures can be gathered from a variety of sources; a digital camera is useful, as is a scanner. A lot of clients provide material swatches and it's not unusual to be given squares of carpet to scan."

Of course, the level of detail needed depends on the end requirements. "I've found over the last year that going to the nth degree in texture detail, isn't required commercially," comments James Rothschild. "I used to spend ages doing the bump maps for bricks and everything, and even the bricks had textures. I suppose that's all right if the end result is a massive poster, but on a A4/A3 brochure, it's really more effort than it's worth. It's certainly more expensive in time, and budgets just don't allow for that."

Something that budgets are increasingly allowing for though is animation. "That's happening more and more," says Visualize's Stuart Rowbottom. "With that in mind, generally people start off with the still, then we point out to them that if you're going that far to have a model built, textured and rendered, it's only one stage further to go for the animation. Obviously you've got a little bit of time messing around and setting up animation paths and what have you, but other than that it's only really rendering time."

How the animation is done depends on what's required. Many a company has hidden less than perfect modelling by using fast-moving animation paths and aggressive editing. It's the animated equivalent of showing a building lit up from the inside at night; it all looks very nice but in visualisation terms it's of debatable value. The aim of visualisation is largely to convey information, so slow paths that simulate the effect of someone driving up to the building and adding keys in the path's corners are what's required. That doesn't mean they have to be restricted to fly-bys. Real-Time's work on the *Grand Designs* series for Channel 4 showed homes rising up from their foundations, building up layer by layer. Houses were animated in ghosted form and cutaway, peeling away the outer shell to see the layer inside.

Great expectations

Animation again raises client expectations. Real-Time has hired an ex-games company artist specialising in character animation just to show people moving through their scenes. Fortunately, as expectations increase, so does the capability of the software to deliver on time and in budget. *MAX 3*'s External Referencing is a good example. Take an office interior. An individual workstation can easily rack up the poly count when desk, computer, chair and books are taken into account, and given the size of some open plan offices that can lead to extremely high poly scenes that are difficult to create and manage.

Using X-Refs though, the artist creates one workstation to work on, that doesn't exist in the scene. "You duplicate it hundreds of times and it doesn't have the horrible effects of increasing the file size the way duplicating a 20,000 poly workstation does," says Prosser.

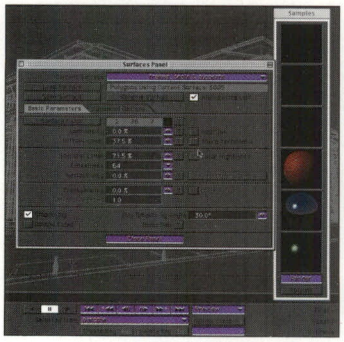
Where exactly visualisation is going in the next few years is a tricky one. Constantly improving image quality is the underlying theme, and it's a reasonable bet that more convincing landscape generation will percolate down from the high-end toolsets, while workflow tweaks and improvements will lead to more cost effective production times. The use of human figures looks set to increase too, and their integration in, and interaction with, the 3D environment is a growing trend in this field as it is elsewhere in 3D.

> **"Budgets are increasingly allowing for animation, but many a company has hidden less than perfect modelling by using fast-moving animation and aggressive editing"**

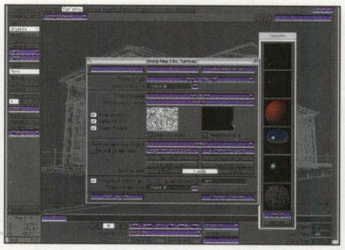
Information

Axiom **w** *www.axiomweb.co.uk* **t** *0113 266 5146*
Real-Time Visualisation **w** *www.realtimeuk.com* **t** *0700 0255 025*
Visualize **w** *www.visualizedigital.com* **t** *01772 736 332*

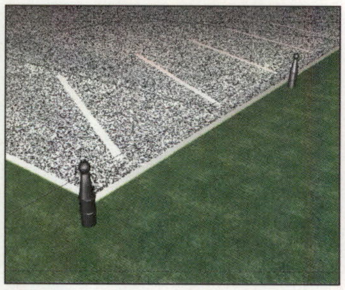
Building sights continued...



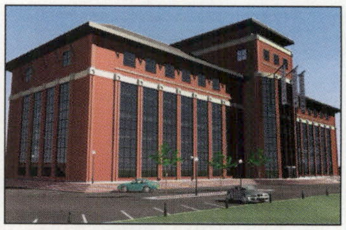
9 Apply a dark green colour to the window frames and set the surfaces to diffuse 37 per cent, specular 71 per cent, glossiness 64 per cent. This gives a plastic surface effect to the frames.



10 The Tarmac was produced simply by giving the surface a bump map which was created in *Photoshop* using gaussian noise on a black bitmap. This was then applied as a planar bump map on the Y axis, to a size of 2m square. The colour for the tarmac is set to an RGB value of 84/62/59, with the surface attributes set at high diffuse, low specular and low glossiness.



11 Finally, we can apply a surface to the grass, this is simply a planar image map tiled in the Y axis using the grass.tga image and the same bump map used for the Tarmac but at half the size. The surface attributes for the grass are set to a high diffuse, low specular and a low glossiness.



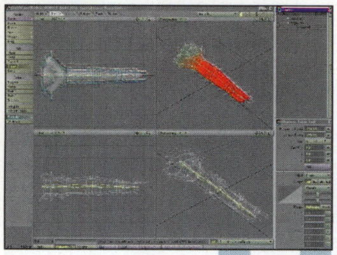
12 Before the final render, the camera viewpoint must be finalised. Choose a low view point, at about eye level which is roughly 1.5 to 1.8m. The low view point helps to create the impression of the buildings size as this would be the normal viewing height in the real world. Add a gradient backdrop, set at RGB values zenith-26/133/204, sky-207/214/255 for the sky. And then produce your final render.

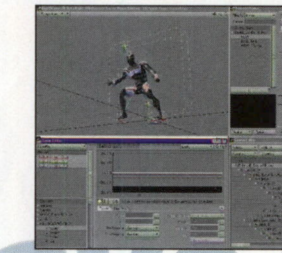
worth over £1500

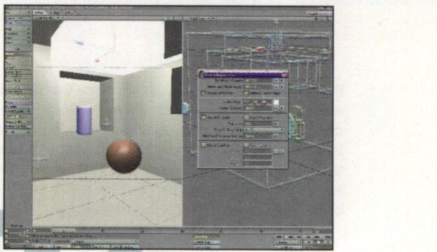
Fifth Element Blade The Avengers Contact Barney's Great Adventure Anastasia Devil's Advocate Men in Black

> *"Lightwave 3D is the only software that we can depend on for 3D creatures. With its easy-to-use interface, it allows us to stay on budget, on schedule and make the creatures move and look great."*

Everett Burrell, effects supervisor on *Babylon 5*







win Lightwave 3D 6

HERE'S YOUR CHANCE TO WIN THE VERY LATEST VERSION OF THIS INCREDIBLE 3D PACKAGE...

Even if you haven't heard of *Lightwave 3D*, we're sure you've seen it in action. In fact it's so widely used in the entertainment industry we couldn't possibly list all the movies, TV shows and games it's been used in. A small selection of ones you may have heard of include *The World is Not Enough, Starship Troopers, Star Trek: Voyager, The X-Files, Babylon 5, Titanic* and *Armageddon*. Impressive, huh?

Lightwave's popularity stems not only from the amazing effects it can generate, but also from the fact that it's so easy to use. Even if you're an artist with little or no computing experience, if you sit down and play with *Lightwave* for a while you'll soon feel at home with it and learn to embrace its power. Even so, NewTek has been listening to its users since version 5.6 and taken on board heaps of feedback while designing the new features of version 6.

For instance, with previous versions of the program some users found character animation to be a bit of a chore, so NewTek has created Skelegons, a new type of polygon that appears as a 3D bone for the purposes of animation. Modify your character and the bone structure is updated automatically, saving you going back and recreating your entire animation.

That's just one example of how *Lightwave* is moving forward with version 6. Radiosity and caustics rendering are offered, plus powerful new modelling tools and a more production-orientated design. In all, *Lightwave 6* represents over ten years of development, and NewTek reckons this is the most significant upgrade ever made to *LightWave 3D*.

That's enough chat. You want to know how to win this exciting new piece of software. Well, just answer the question left and send us your details... ca▸s

The competition

Q What is a Skelegon?

a) a monster in Babylon 5
b) a 3D bone
c) the bad guy in He-Man

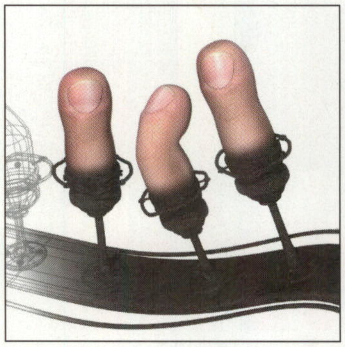
To enter

Write your answer, along with your name, address and telephone number on a postcard and send it to *Lightwave 6* Competition, Computer Arts Special, 29 Monmouth Street, Bath, BA1 2DL. Include with your entry whether you want an NT or Mac version of the program. If you wish to enter by e-mail, send your entry, entitled *Lightwave 6* Competition, to caspecials@futurenet.co.uk.

The rules

Closing date is February 8, 2000. Employees of Future Publishing, NewTek and PAR Services, and any of their agents or families, may not enter. One entry per reader. The editor's decision is final, no correspondence will be entered into and there is no cash alternative. No purchase necessary.

Paul Oglesby hopes that Picture Garden's texture collections will encourage artists to be more creative: "We still fully expect people to source their own textures, too, but at least we can inspire them. And every texture artist that I know is always hungry for more textures. The more textures the better – you can never have enough."



Picture Garden

"Texturing really is a skill in itself, and yet so many people overlook it..."

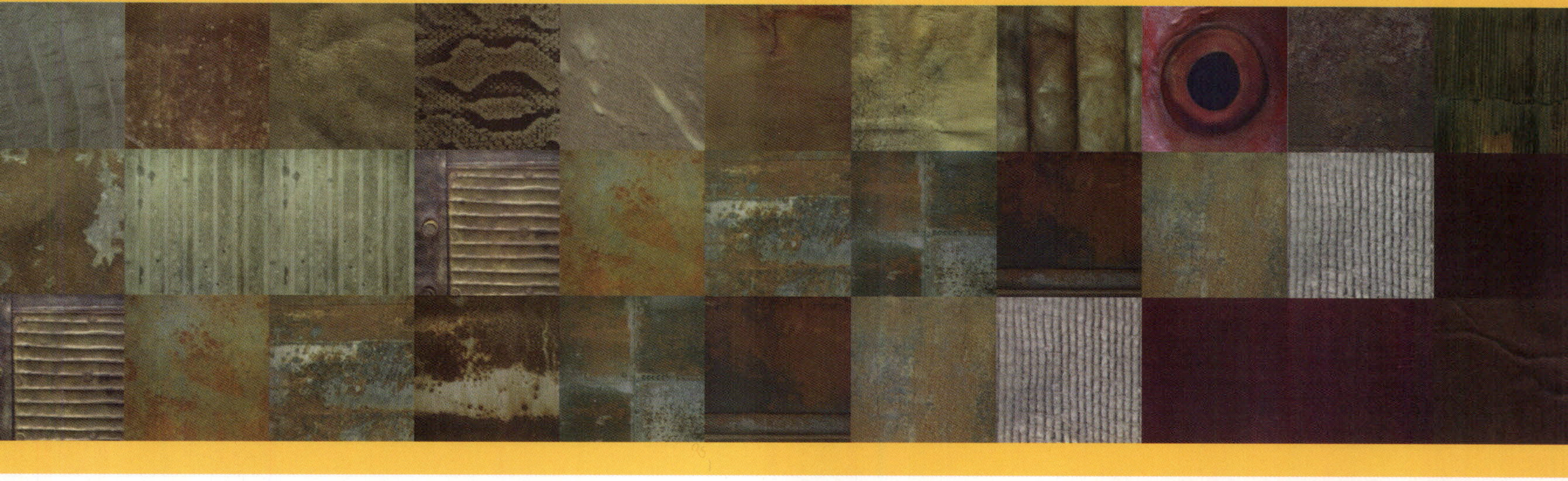
Picture Garden are texture specialists who aim to inspire 3D creatives

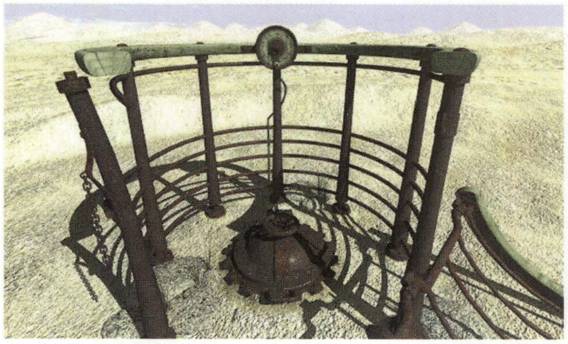
Finding a niche in the computer graphics industry is no easy task, but by specialising in the creation of photo-realistic textures, newcomer Picture Garden has effortlessly filled a gap in the market. The aim – to supply artists with an archive of high quality textures – is simple enough. But because texturing is traditionally such a neglected area, the company's ability to provide these raw materials promises to be a godsend for 3D modellers and 2D artists without the time, resources, or ability to generate their own textures from scratch.

"We've been in the computer graphics industry for about six years now, and came to realise that while people like Viewpoint were selling pre-generated models, nobody was supplying textures. At least nothing very exciting," explains Picture Garden's Paul Oglesby. "Initially it was a case of supplying a few colleagues with textures, then we realised we could really do something with this." In response, he and partner Darryl Engert compiled and released *Base*, a CD of 450 high resolution textures covering nine basic categories, from ceramics and stones, to plants, skins and ground coverings.

"They've come from all over the place, from Indian temple carvings to Chester Zoo and even Manchester Airport," says Paul. The latter provided an unlikely source for the leather and skin textures, with Picture Garden gaining access to items impounded by customs officers.

Base is merely clearly the tip of the iceberg, with an ever-vigilant, globe-trotting approach to image acquisition resulting in a collection of some 20,000 texture files. Due in January, *Creature Shop* is the next CD set to be released, with more CDs expanding on existing categories and introducing new ones to be



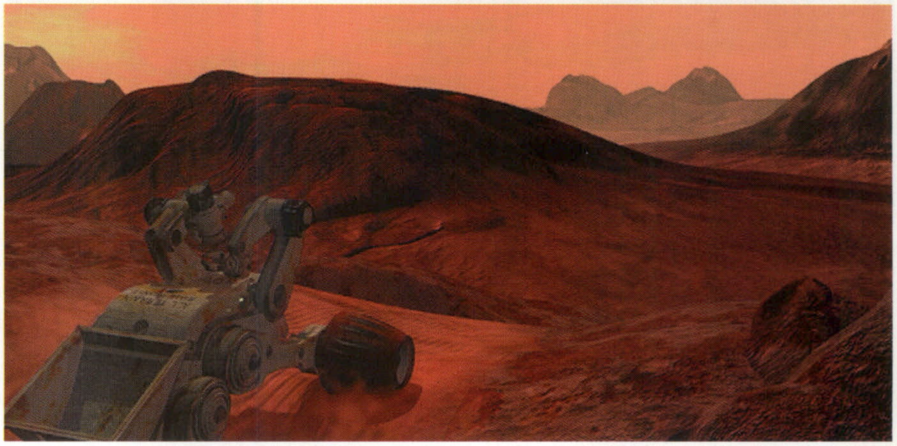


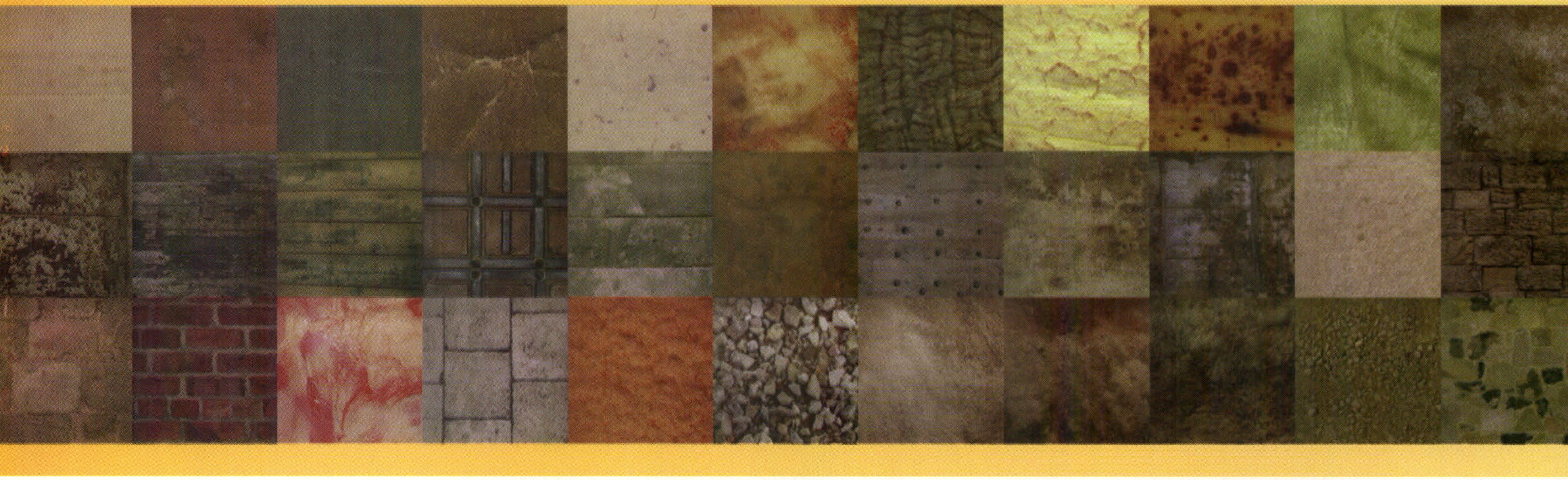
issued as the pair work through their archives and seek out new images for inclusion. "Our library's constantly expanding, we're still looking wherever we go," says Paul. "One brick wall in London is going to be radically different from one in Edinburgh."

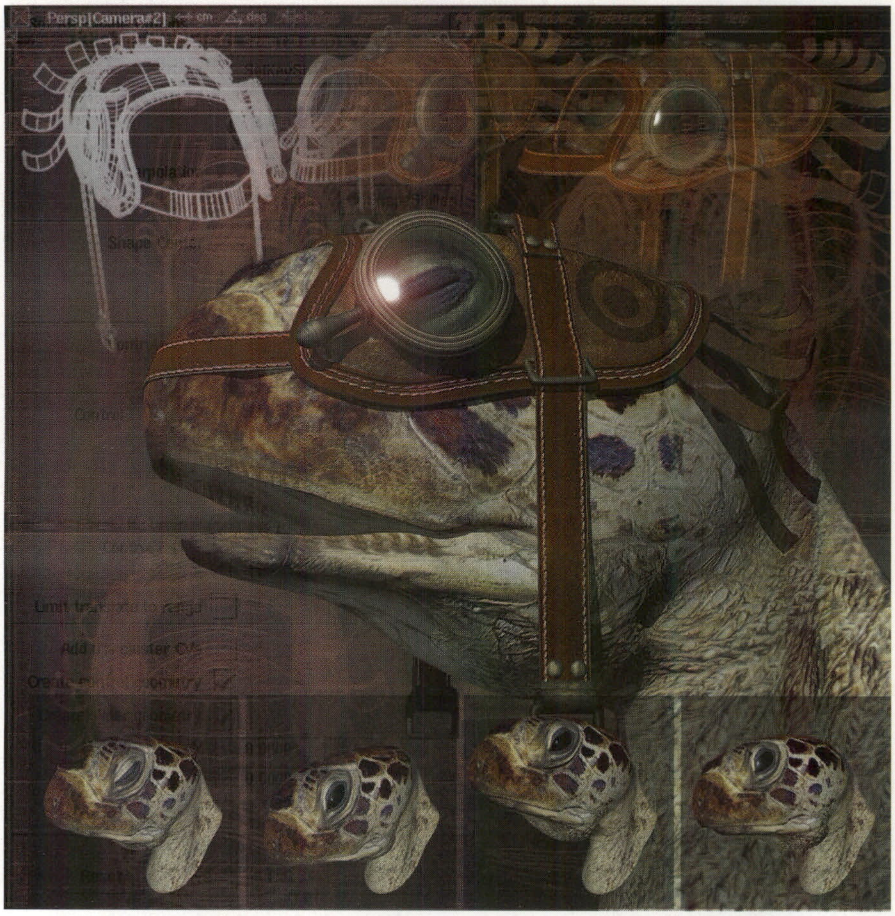
Every single image in the Picture Garden archive has been created using their own photographic work. "We never draw a texture from scratch," explains Paul. "You just can't create a realistic result with hand-drawn textures. If you want a render to look real you've got to use a real texture, and so everything we have is sourced from the real world." Inspiration for Picture Garden is literally everywhere. "You can walk through the street, and if you keep your eyes open useful textures are everywhere. You do tend to get funny looks when you walk up to a wall and take photos of it, though," laughs Paul.

Paul is the first to admit that the process isn't complicated. Although they run two O2s, a Solid Impact and Indigo Extreme, this is primarily for other continuing work in the computer games industry, working on pre-rendered FMV, low-polygon real-time models, and to-print artwork. For the textures, they simply take the shots with a standard SLR camera – a Nikon F90, scan the slides, then work on them in *Photoshop*.

Much of the talent lies in know what to photograph and how. "Getting decent textures – processing, mounting and scanning – is also quite expensive," points out Paul. Digital cameras and desktop scanners do offer a cheaper alternative for artists. But digital camera output is compromised by file compression, while desktop scanning of slides is generally of a poor quality, and scanning actual photographs gives grainy results. "If we see a surface we like in real life we try to get as accurate a representation on our screens as possible," emphasises Paul. ⇨







Inspiration for textures comes from some unlikely sources, explains Paul Oglesby: "They've come from all over the place, from Indian temple carvings to Chester Zoo and Manchester Airport."

> *"People often don't have the time or the inclination to create their own textures. And while a lot of people spend time building a 3D model, they often don't consider what texture they're going to use"*

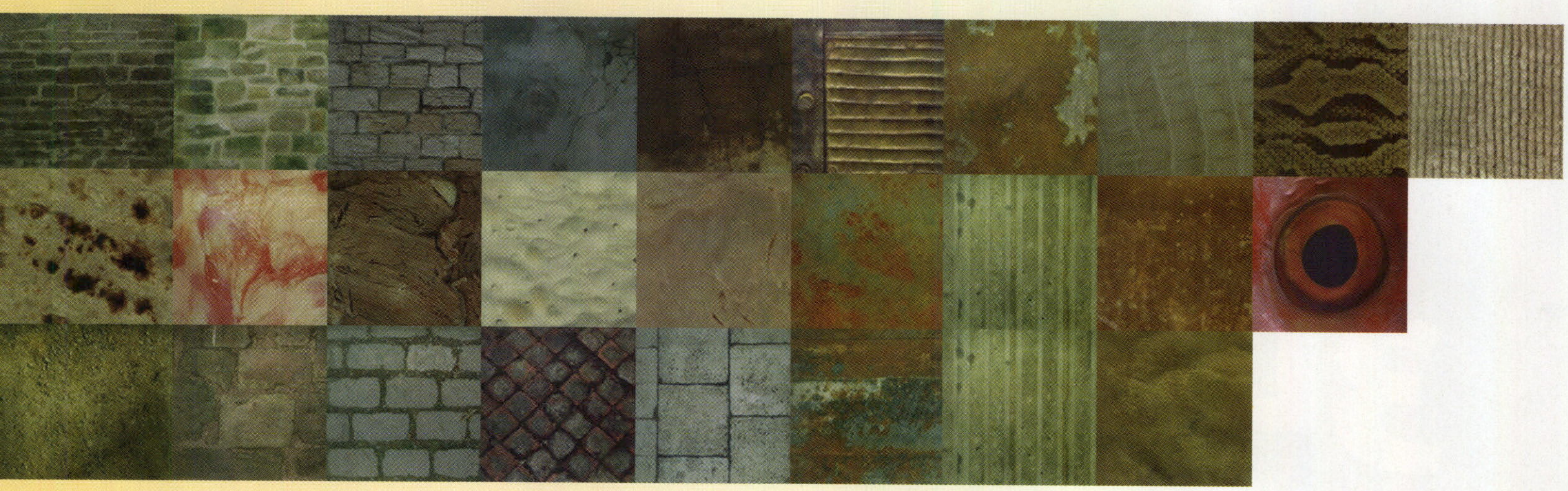
This involves such obvious considerations as ensuring a uniform colour tone, and taking care to avoid pronounced light and shadow in raised or lower areas. Too much will suggest a light source, naturally making it unsuitable for 3D modelling. "You can get away with some shadow, or can always paint it out later, but often it's easier to simply wait five minutes to get the right conditions for taking the shot."

With Picture Garden selling the *Base* CD via the Internet, it's difficult to track which companies and which artistic fields are making use of the textures. But the demand is definitely there. "People often just don't have the time or the inclination to create their own textures. And while a lot of people spend time building a 3D model, taking care to make sure it renders quickly and has clean surfaces, they often don't consider what texture they're going to use. I've seen some models with beautiful geometry that really look dreadful, because they've been texture mapped so badly. And it's terrible to see somebody using the textures that have been supplied with rendering software. We make it possible for them to acquire at least one CD to expand their library of textures. And we're certainly not prohibitively expensive. The price per texture is very small."

Paul also hopes that Picture Garden's work will encourage artists to be more creative. "We still fully expect people to source their own textures, too, but at least we can inspire them. And every texture artist that I know is always hungry for more textures. If you've got a texture in your library it can really inspire you, whereas you'd probably never consider using a texture that you'd have to go and source. The more textures the better, you can never have enough."

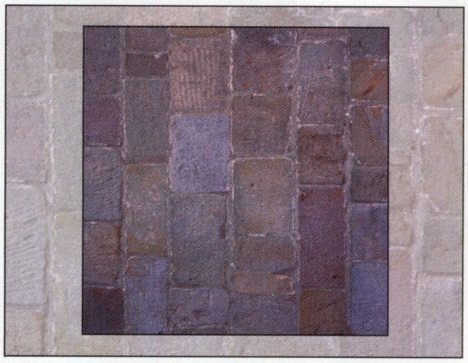
Information

Base costs £55 (excluding VAT and P&P). Contact Picture Garden on ***t*** *01423 529 992,* ***f*** *0870 740 2776,* ***w*** *www.picture-garden.com or* ***e*** *info@picture-garden.com. The Website also contains six free downloadable textures, thumbnails of additional files from Base, plus several example rendered scenes created using textures from Base and the forthcoming Creature Shop CD.*

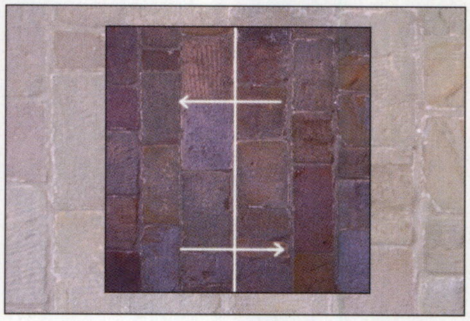


Tiling a texture

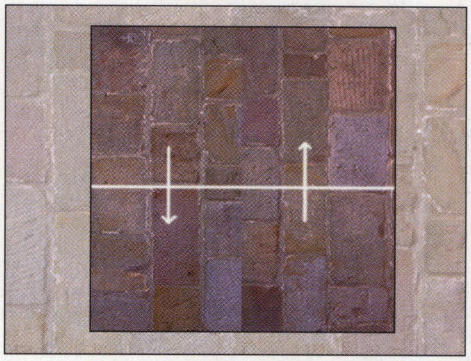
Picture Garden has provided 15 professional textures on our coverdisc, but it's quick and easy to generate your own, to give your artwork that seamless textured look. Here's how Picture Garden perfect their textures in *Photoshop* – simply follow these six steps to create your own. It's just another brick in the wall...



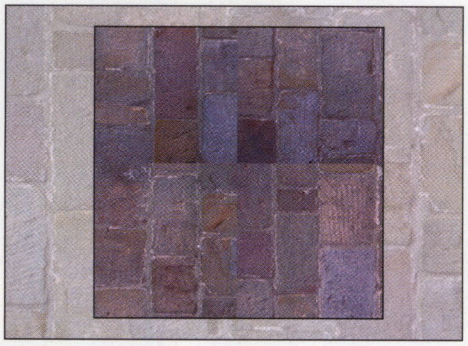
1 Load your selected scan into a good paint package like *Photoshop*. The first job is to quarter the image so that we can see the edges and how they work with each other.



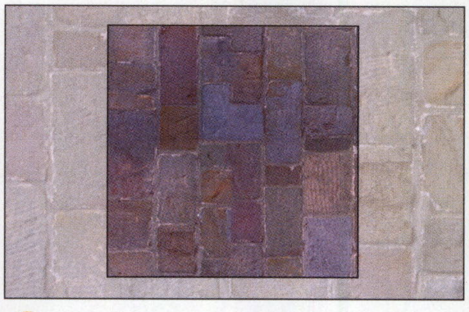
2 Select the left hand side of the image and make a copy, then cut this section away. Next select the right half and move it horizontally so that it buts up exactly with the edge of the canvas. Select nothing then paste the original selection and position this to the right, effectively flipping the two halves.



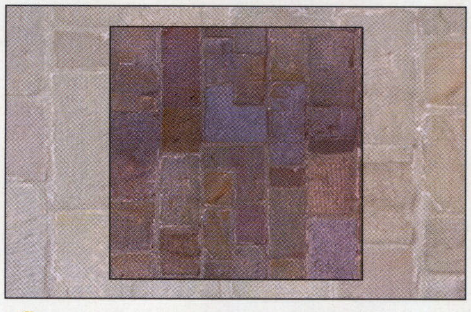
3 Repeat these steps with the top and bottom portions. You will need to keep flattening the image if your version of *Photoshop* automatically creates layers from selections.



4 Our image is now quartered. Take a good look at how the colours change where the cut edges meet each other. We have been lucky in places but the centre portion has a lot of contrast.

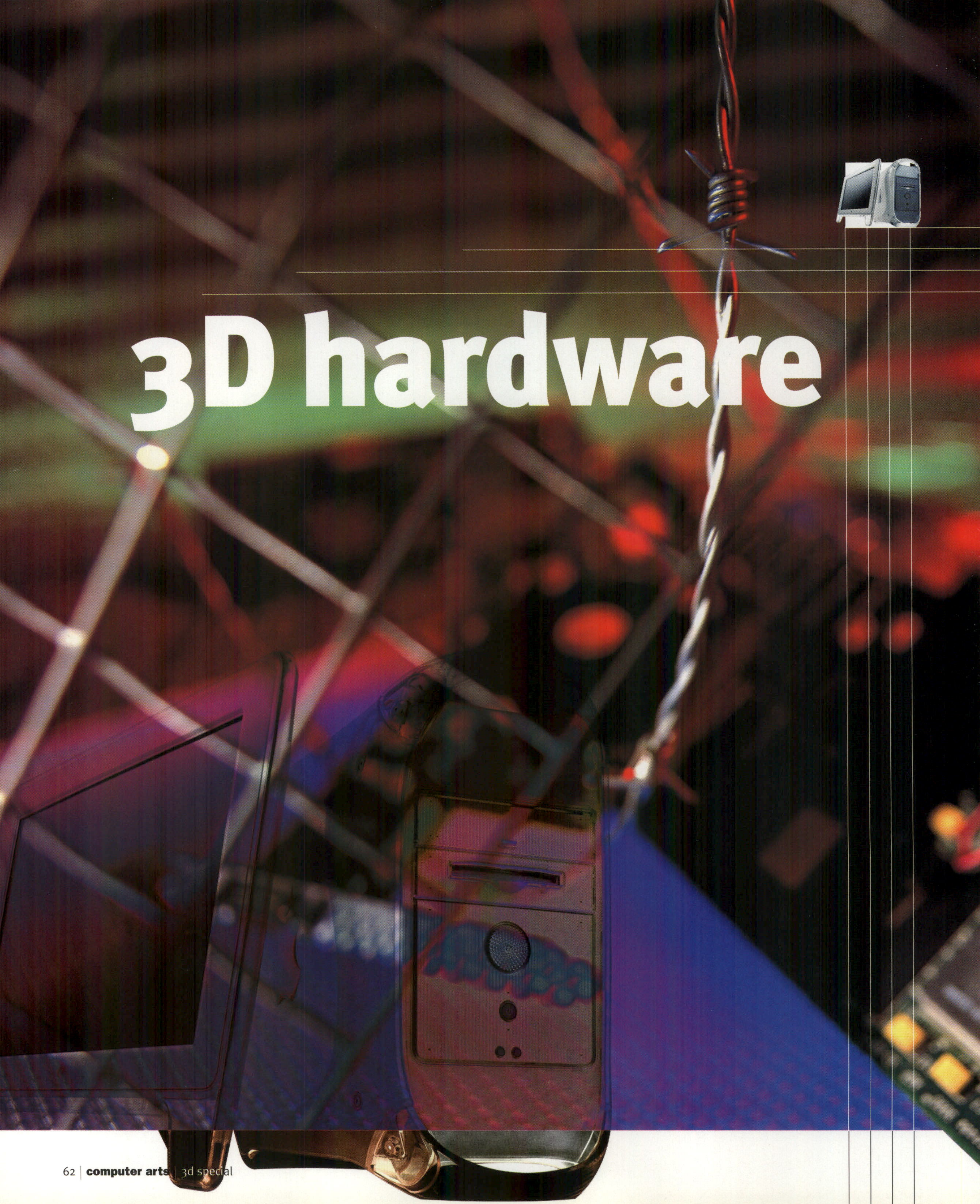


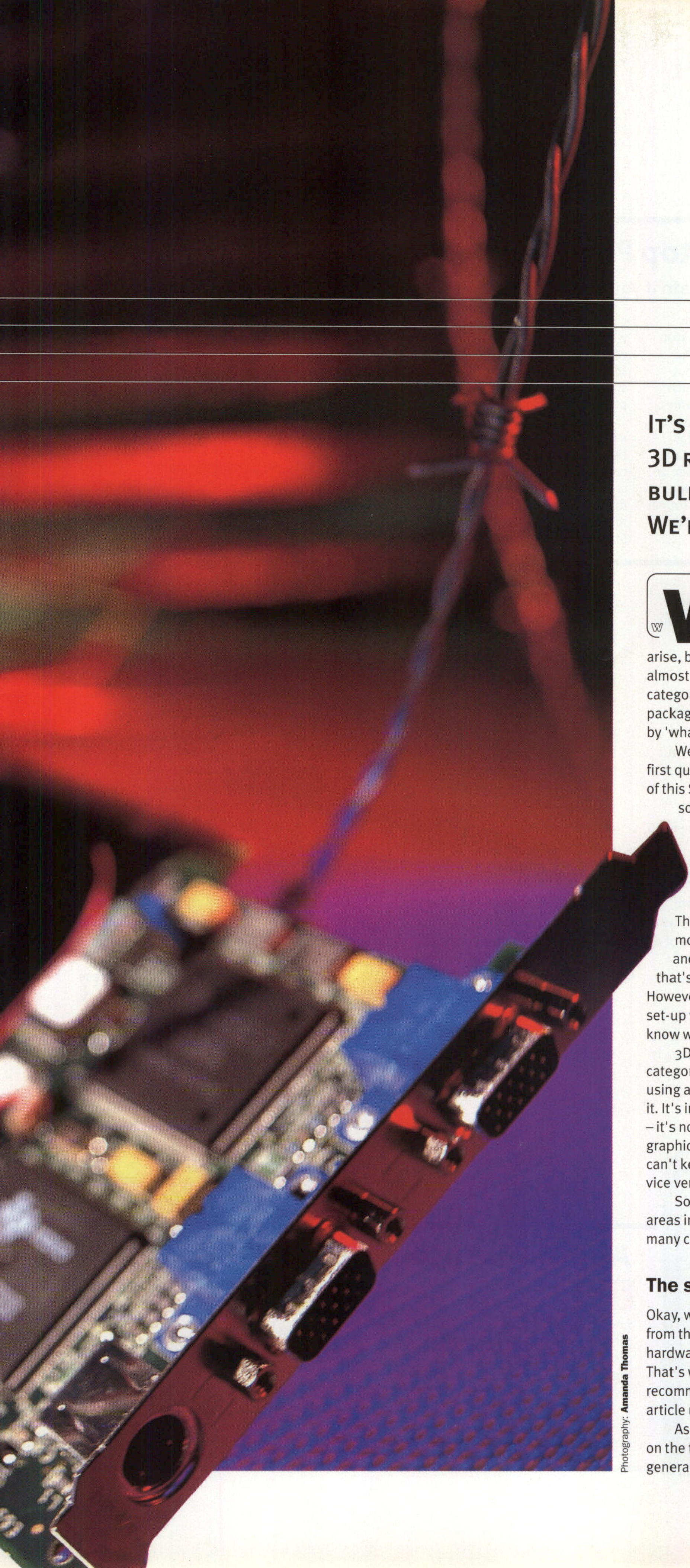
5 Begin to paint using the clone tool – choose areas to copy that are similar in hue to the offending join. This way your modifications will be less noticeable. The centre has been re-invented, accomplished by stealing small sections from other blocks.



6 The finished seamless texture. View your work from different angles, rotate it or flip it, this helps to freshen the image in the mind and you may spot things you missed before. Cloning has a tendency to blur the pixels a little so we have sharpened the image after all the painting work has been done.

3D hardware





Photography: Amanda Thomas

IT'S A REAL MINEFIELD, BUT IF IT'S PROFESSIONAL 3D RESULTS YOU WANT, NOW'S THE TIME TO BITE THE BULLET AND INVEST IN SOME QUALITY HARDWARE. WE'RE HERE TO GUIDE YOU ON YOUR MISSION...

When it comes to getting started with 3D content creation, there are two questions that inevitably arise, both inextricably linked and both almost impossible to answer categorically. The first is 'which 3D package should I use?', swiftly followed by 'what sort of hardware is best for 3D?'

Well, we're not going to tackle the first question here – that's what the rest of this Special is about – but since solving the second usually results in a fairly massive outlay in terms of hardware, it demands some serious pondering.

Choosing the right hardware for 3D work is a daunting task. The general theory is that the more money you spend on cash, the faster and more powerful it will be – and that's true, to a certain extent. However, you can also get a blistering set-up without breaking the bank, if you know what you're looking for.

3D hardware basically falls into two categories – the host machine you're using and the 3D accelerator installed in it. It's important that both parts are right – it's no good having a super-fast graphics card if your basic system simply can't keep up with feeding it data... and vice versa.

So, let's look at each of these two areas in turn and try to make sense of the many choices available...

The simple truth

Okay, we'll lay our cards on the table from the start – there is no one 'best' hardware platform for working with 3D. That's why you won't find recommendations at the end of this article urging you to buy X, Y and Z.

As ever, it depends to a large degree on the type of 3D work you're doing in general and the software package you're using in particular. One system might scream through rendering with *Cinema 4D*, yet get bogged down when it comes to displaying complex real-time NURBS in *Maya*. Each has its strengths and weaknesses, but if you're armed with enough basic information, you should be able to make an informed choice about what's right for you.

Mac or PC?

Bang! We've only just started and already you have to make a decision: Mac or PC? Actually this is probably the most important part of the process, as well as the most hotly-debated and personal area.

So let's start with the plain truth – there simply isn't as much quality 3D software available for the Mac as there is for the PC. None of the 'big three' packages used by the pros – *SoftImage*, *Maya* and *3D Studio MAX* – is available in Mac versions, and that situation isn't going to change any time soon.

Having said that, *Lightwave 6* certainly is available on the Mac, as are the likes of *Infini-D*, *Ray Dream Studio*, *Carrara*, *Bryce 4*, and some other lower-end packages. (Of course there are PC versions too.) In general, though, just as the Mac wins hands down for pre-press/design software, so the PC wins for 3D graphics.

Speed is the next big factor. Apple would have you believe that its new G4 chip blows away Intel's Pentium III, but take that with a pinch of salt. In speed terms the G4 and the PIII are, on balance, pretty much equal – albeit with each running at different clock speeds – when it comes to 3D rendering. The operating system plays a big part in the speed factor, anyway (as we'll see later).

Two unfortunate minuses on the Mac side are the lack of decent 3D accelerators and the lack of multi-

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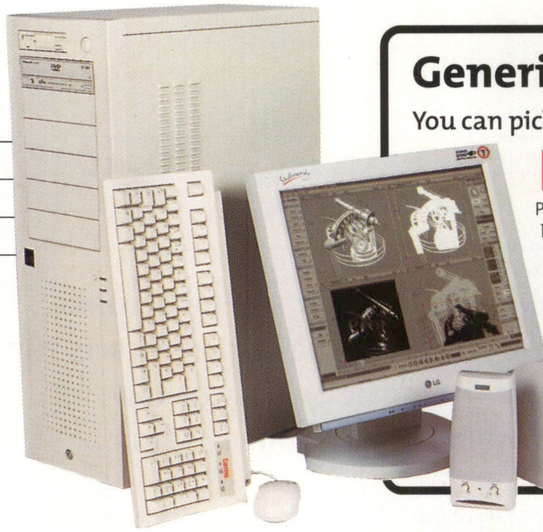


Shop around and you can easily pick up a desktop PC for £700 – if you aren't bothered about after-sales service.

Generic desktop PC

You can pick up a bargain if you know your stuff

Pricewise, the generic desktop PC is the best of the bunch. If you're not bothered too much about brand names, after-sales back-up and frilly extras then you can easily pick up a blinding system for not much money at all.

However, you really need to know what you're doing, both in terms of what spec to buy and – in the case of something going wrong with the system – how to fix any technical problems that might arise.

The other bonus is choice: with so many PC manufacturers out there on the market, and such fierce competition, you can virtually pick and choose to your heart's content. The desktop PC offers a relatively risky route, then, but it could just pay off.

Starting price: around £700

processing. New Macs come with an okayish but not great ATi 3D card; if you want to upgrade this, you'll find your options very limited, and you'll pay through the nose too.

More seriously, Apple Macs currently can't use more than one CPU, unlike PCs, which – with a suitable motherboard – can use two or even four CPUs simultaneously under Windows NT. Multiprocessing can hugely decrease rendering times and all the major 3D apps fully support it, so it's a shame not to be able to take advantage of it.

Of course the other major deciding factor between Mac and PC is personal preference. Mac OS and Windows are two very different beasts, and each has its fanatical followers. This is a more of a general preference rather than a 3D-related one and you'll doubtless have your own thoughts on it.

Should you choose to buy a Mac, you're in fairly shallow waters when it comes to computer type. After all, a G4 is a G4. There aren't thousands of clones to choose from, just Apple's single design. All you need do is select the maximum speed, amount of memory and hard drive space you can afford.

PC performance

In PC-land it's a whole different ballgame. A PC might appear to be much the same as any other, made up of similar bits and bobs, but in reality their internal components and even architecture design can vary radically – with resulting changes in overall system speed. For our purposes we've divided up PCs into four categories: generic desktop PCs, graphic workstations, Intergraph and SGI.

Generic PCs are the type sold by just about every manufacturer there is, from no-name mail-order box shifters to the likes of Compaq, Dell, IBM and so on. They're general-purpose machines using standard components but usually specced according to intended usage.

Generic PCs represent great value for money if you know what you're looking for, and any decently powerful machine should work fine with many 3D programs. A 400MHz PIII, 64MB RAM and 2GB hard drive is really the minimum you can get away with.

The next step up is the graphics workstation. These are PCs intended specifically for graphics or 3D work, built from the ground up using quality components and carefully designed to maximise performance.

Again, most of the major manufacturers produce such machines – HP's Kayak range or the excellent Storm workstation from Max Black are good examples. Workstations give you the option of real high-end kit you won't find elsewhere, such as dual Intel XEON processors, support for 2GB of RAM, Ultra II LVD Dual channel hard drive controllers, flat panel display output, high-speed network options and so on.

Workstations are machines for professionals with mission-critical work. As you might imagine, such kit is seriously speedy and ultra-reliable – but at the same time you pay a premium for such quality, way above 'normal' PC prices. If your 3D work is more than just a hobby to you, a quality workstation is recommended.

High-end as workstations are, at the end of the day they're still conventional PCs with conventional internal design. However, two manufacturers have taken things one step further and actually redesigned the PC to improve performance, while keeping it compatible with existing software. These two are Intergraph and SGI.

Intergraph's professional workstations are legendary for their speed and reliability. Not only do they

> ***"Should you choose to buy a Mac, you're in fairly shallow water when it comes to computer type. After all, a G4 is a G4. There aren't thousands of clones to choose from"***

The G4 is a powerful beast but there's a dearth of software at the moment.

Apple Macintosh G4

Check out the silver surfer

Though the speed and the friendliness of the new G4s are certainly attractive, there's still a distinct lack of quality, high-end 3D software available for the platform. That situation may change, however: *Houdini* is rumoured to be ported soon, there's a version of *solidThinking* on the way, and if Apple continues to win new fans at the rate it's going, it's possible that *Maya* and *Softimage* will eventually appear in Mac format as well.

Other disadvantages include an operating system in dire need of modernisation, a lack of multi-processing and a relatively high price compared to equivalent PC systems. Once again, though, all this could change, and sooner rather than later.

Starting price: £1100

SGI Visual Workstations Make a big splash

A relative newcomer to the desktop PC market, SGI made an enormous splash with the launch of its NT-based Visual Workstation machines early this year. Much was expected from the world leaders in high-end 3D kit and, on the whole, SGI has delivered – though some customers have reported incompatibilities and problems with various pieces of software and hardware.

Like Intergraph, SGI has eschewed the conventional PC design and replaced it with its own proprietary bus, graphics chips and other components, making for really scorching performance (and not just for 3D, either).

The SGI Visual Workstation is surprisingly cheap, at least for this level of spec and compared to other manufacturers, so bearing in mind the potential teething troubles, it's an excellent buy. **Starting price: around £2340**

feature the company's blisteringly fast custom-made 3D accelerators such as the Wildcat 4105, they improve on the PC's main area of data bottleneck, the system bus.

The TDZ 2000 GT1, for instance, features something called Concurrent Multiport Architecture which massively increases system bandwidth over the usual AGP bus. Throw in dual custom memory controllers, optimised memory performance, advanced I/O caching and a very natty case, and you're looking at one serious PC. In fact, Intergraph claims it's the world's fastest Windows NT workstation.

Similarly, SGI's Visual Workstation 320 and 540 machines feature all manner of improvements to standard PC design. There's SGI's proprietary Integrated Visual Computing architecture, together with its amazing Cobalt graphics chipset, plus the option to have up to four XEON processors and 2GB of RAM.

As you might imagine neither the Intergraph nor the SGI machine comes cheap (though the latter is actually very reasonable, given the spec). You'll need to be very serious to shell out the £7000+ such machines will set you back for a decent spec.

Operating systems

Choosing an OS is actually fairly simple compared to everything else. On the Mac you've got no choice anyway – you're stuck with the rather antique Mac OS, with its useless memory management, lack of pre-emptive multi-tasking and no support for multi-processing. It might be easy to use but Mac OS is seriously lacking in technical terms – something which ought to be rectified with the release of OS X.

On the PC, there's only one serious choice, Windows NT 4.0. Many 3D packages won't run properly on anything else, and every workstation comes with it preinstalled. It's simply better all round than Windows 95/98, at least for heavyweight 3D apps: faster, more stable, fault-tolerant, with proper multi-tasking and so on.

Its major drawback is a lack of support for newer peripherals – and it can be a real nightmare to set up or troubleshoot if things go wrong. Fortunately, the long-awaited successor, Windows 2000 Professional, is just around the corner, which should address all those problems and more.

On the horizon

Of course hardware is changing all the time and new chips, operating systems and speeds are inevitable. One chip definitely worth keeping an eye out for is the Athlon from AMD, which promises to be the first serious competitor to Intel's Pentium III.

So far, benchmarks indicate it's actually significantly faster than a PIII while costing much less – which obviously means it's a prime candidate for top-end systems where speed is paramount.

Systems based around the Athlon aren't widespread, while its compatibility with major packages hasn't yet been established properly (there's a remote chance of some incompatibility creeping in). Nevertheless, the Athlon could spell the end of Intel's monopoly, and mean cheaper, faster systems for all. Intel itself will have chips running at 1GHz before the end of next year.

Meanwhile, Apple's new G4 machines, with AGP graphics on the motherboard and other long-awaited enhancements, should be here soon – along with an increase in the number of third-party 3D accelerators for the Mac.

Remember, though, there's never a good time to buy hardware. Work out what you need, stick to your budget, and wade in there. Good luck...

Graphics workstation

Professional performance and all the back-up you need

Not really that much removed from a generic PC – after all, the innards are pretty much the same. But with a dedicated workstation, you know you're getting a PC built from the ground up with speed and reliability for 3D in mind.

Manufacturers like Max Black produce high-end workstations (such as the one shown here) that excel in terms of build quality and components, plus you'll get all the expert back-up and technical advice you could need – especially if you buy a combo hardware and software bundle. For pro use, it's really a false economy to plump for anything less. **Starting price: around £1500**

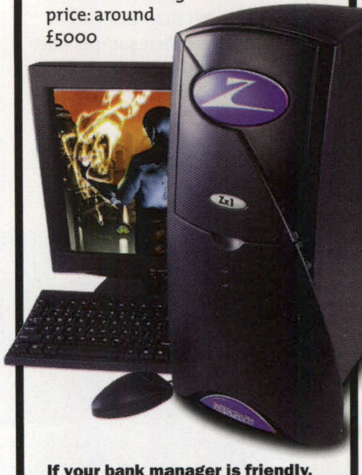
Intergraph workstation

Choose 3D acceleration that's second to none

Intergraph blazed a trail in creating truly high-end professional workstations, and is still probably the most highly-regarded and recommended company among 3D professionals.

Not content with the standard PC design, the company has tweaked and improved many aspects of the machine to radically increase speed and performance, from the CPU to the graphics card and beyond. Its 3D accelerators are second to none, particularly the Wildcat range which is simply unsurpassed.

The downside? A hefty price, even at this level – this is not an option for the hobbyist or the faint of heart. **Starting price: around £5000**



If your bank manager is friendly, put this on your shopping list.

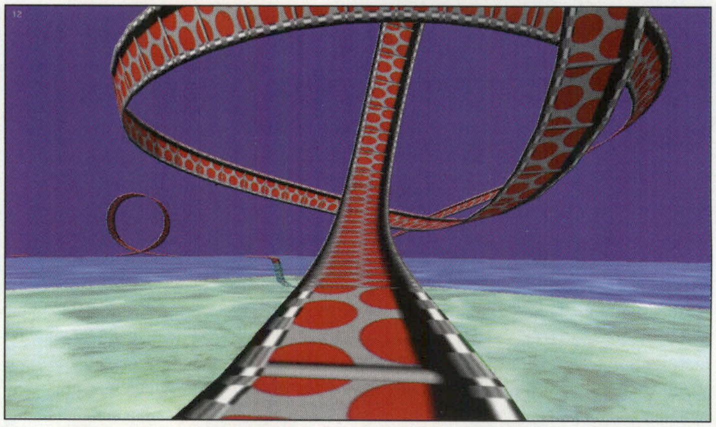
graphics cards

A GOOD CARD IS CRUCIAL TO YOUR COMPUTER'S 3D PERFORMANCE. WE HELP YOU CHOOSE...

Choosing what kind of computer is best for creating 3D projects is one thing. It's when you move on to the sticky subject of graphics cards that things really get confusing. The 3D card market has been on fire of late, particularly at the consumer end. Game developers and 3D chip designers have been working hand in hand to push the hardware to its limits, squeezing out enormous pixel fill rates, whopping resolutions and staggering colour depths. Prices have come down, and what used to be plain Jane multimedia graphics cards are now touching on the levels of power previously only seen with high-end workstation cards.

Here we've gathered together a pack of cards ranging in price from around £150 to £1000. Our key criterion for a good 3D is for it to be able to handle OpenGL. Some new cards are designed for home users yet still offer a workable option for 3D hobbyists by bringing OpenGL support, and come with plenty of extras you can enjoy when you're not modelling, rendering or animating. Other cards in the round-up are designed for professional uses. For people who take 3D seriously, and are willing to spend serious money, these models are of more interest.

In between, we've got a couple of cards that seriously challenge the expensive, powerful and serious boards bringing awesome 3D power at a great price. We refer to cards based on the new GeForce 256 chipset – a technology that could have serious ramifications for the high-end 3D market. See what you think.



We put all our cards – both Mac and PC– through a punishing series of graphics tests for 3D, to help you select the best card for your system.

ATi All-in-Wonder 128

price	company	telephone	web
£159	ATi	01628 533 115	www.ati.com

pc only

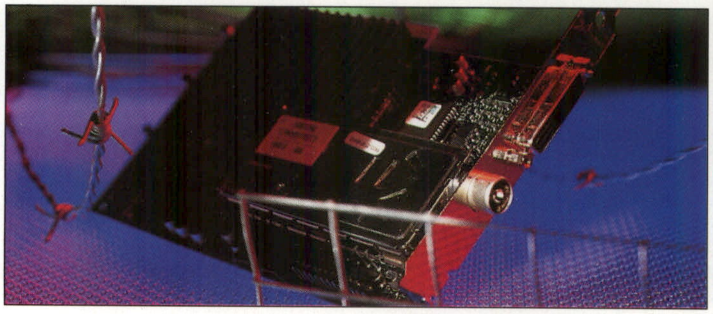
As the old saying goes, you can't please all of the people all of the time. Yet that's exactly what the All-in-Wonder 128 is attempting to do. It works under Windows NT and 95/98 and it has both OpenGL and DirectX drivers.

However, rather than excelling in any one area, the card's resources have been spread thinly in order to provide the most comprehensive integrated solution available. It's a 2D card, a 3D accelerator, a DVD decoder, a TV tuner and it can even record MPEG 2 video. It's based on the ATi RAGE 128-bit chipset, and this provides fast 2D graphics at resolutions up to 1920x1200, making it ideal for draftsmen or *Photoshop* users.

Its 3D performance turned in the lowest performance scores, but its Windows 98 DirectX performance was the best of the lot! If it's going into your only PC, you may welcome its versatility ahead of pure 3D rendering power.

Verdict

★★★½☆



3DFX Voodoo3 3500 TV AGP

price	company	telephone	web
£199	3DFX	01753 502 800	www.3dfx.com

pc only

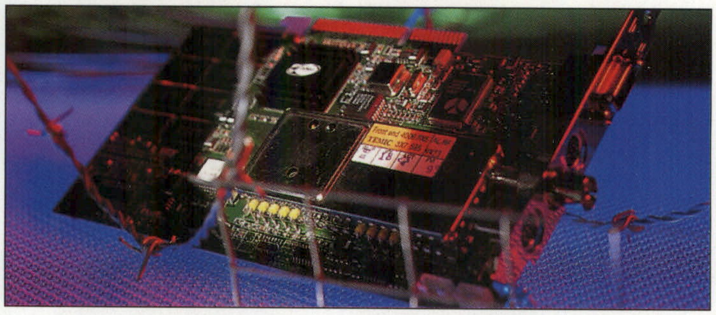
Games players will need no introduction to the Voodoo brand-name. Whereas the other so-called games cards will support Windows NT, the Voodoo3 3500 sticks to the Windows 95/98 platform, making it unique among the cards in this round-up.

Running DirectX 7, it came second to the ATi card by a narrow margin in our *3DMark* speed test, so if you work in Windows 98, it's not a bad choice. It's also the only card that comes with Glide drivers, although this is mainly of relevance to games players. This card's strength is the diversity of its features. It can capture MPEG-2 video, you can use it to watch TV, perhaps do a little 3D rendering, or you can play games. It's adept, though not exceptional, at all of the above.

Ultimately, the Voodoo3 3500 is a card for a family PC that has more to worry about than the performance of multi-threaded OpenGL rendering.

Verdict

★★★☆☆



Elsa Erazor X

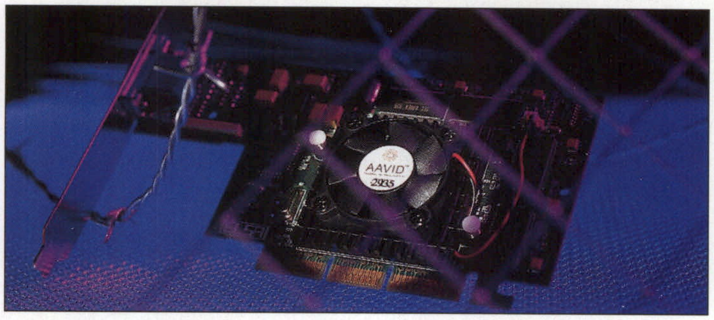
price	company	telephone	web
£199.99	Elsa	08000 563 445	www.elsa.com

pc only

This is the first of the new cards based upon the nVIDIA GeForce 256 chipset. The card is aimed at serious games players, with its support for DirectX 7 and its blisteringly fast 350MHz RAMDAC. Thanks to its OpenGL drivers, graphics users can benefit too. We were stunned by its OpenGL 3D performance. It came top in our benchmark and animation tests. Ironically, its DirectX performance was not so impressive only coming third in our tests. The Erazor X also has features such as a hardware transformation engine, and a dedicated lighting engine with support for up to eight lights. Its 2D is no less spectacular, with support for resolutions up to 2048x1536. Along with the Oxygen cards and the Prophet, this is the highest single-monitor resolution in this group test. It might be designed for gamers, but serious users are the main beneficiaries of this card's power.

Verdict

★★★★★



Guillemot Prophet 3D

price	company	telephone	web
£199	Guillemot	020 8686 5600	www.guillemot.com

pc only

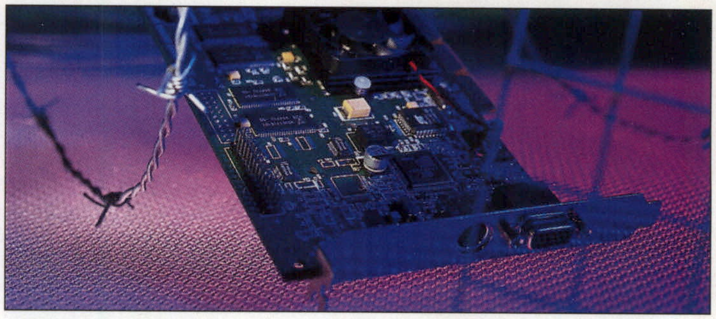
Here's the second of the new nVIDIA GeForce cards. It appears identical to the Erazor, so it's clear that Guillemot and Elsa are using a standard reference design and adding their own software, although we only detected minute differences in performance.

However, whereas the Erazor provided rock-steady performance under both NT and Windows 98, the Guillemot card was anything but stable. The first card we received didn't work at all, while the second one crashed intermittently, and refused our DirectX benchmarking software, despite the fact that it ran fine on the Erazor.

Like the Erazor, the Prophet is targeted directly at the games market. That's not surprising, because that market seems to be doing far more to drive graphics card development than the professional workstation sector. Unlike the Erazor, though, it was a temperamental beast.

Verdict

★★★½☆



3D Labs Oxygen VX1

price	company	telephone	web
£229.13	3D Labs	01784 47055	www.3dlabs.com

pc only

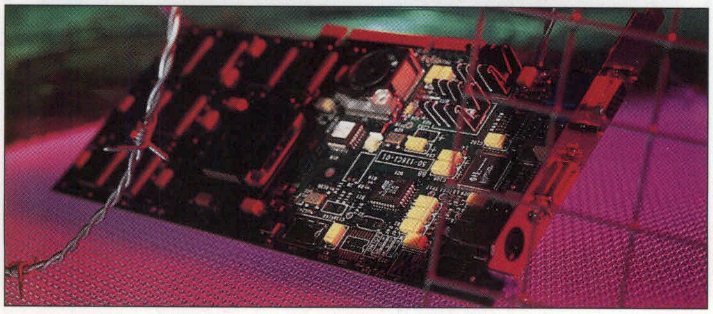
One of the problems with buying a brand new product is the fact that the drivers are not well tested in the field. Unstable or incomplete drivers mean that your results may be quirky or unpredictable. That's why 3D Labs' extensive certification program is an important behind-the-scenes benefit that busy graphics professionals may care to consider.

In terms of processing power, the VX1 is decidedly at the lower end of the scale, and even a number of the games-oriented cards exceed its modest capabilities. However, they don't all support multi-threading, nor do they offer Pentium III or 3D Now! enhancements. In addition, VX1 comes with *Soft Engine 4*, which makes *AutoCAD* run up to four times faster.

If rock-solid performance across all industry standard operating systems is important to you, you may be prepared to exchange raw power for dependability.

Verdict

★★★☆☆



E&S Lightning 1200

price	company	telephone	web
£540.50	Evans & Sutherland	01905 726 782	www.es.com/wg

pc only

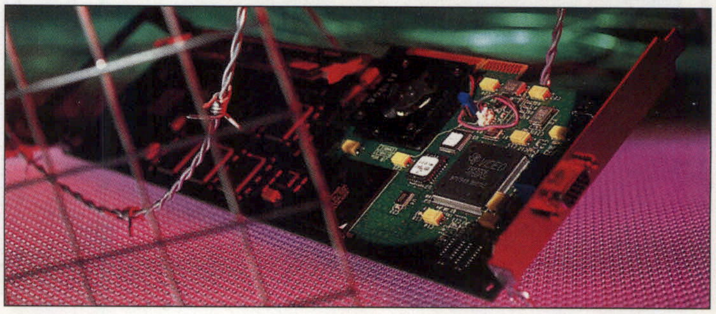
When you move into the higher end of the graphics card market, you often have to look quite hard to discover the features that distinguish one product from another. The Lightning is just such an example. On processing speed alone, it doesn't even make it into the top half of the group. It's okay, but not exceptional. Furthermore, it only runs under NT or Windows 2000.

So what could possibly justify its significant price point? Its image quality perhaps? It uses advanced anti-aliasing techniques that elevate its display above pro cards from rival manufacturers.

E&S is pleased with a feature called DynamicGeometry. This uses your PC's processor for performing transformations, and thus the more powerful your PC, the more powerful the card becomes. It's an expensive yet powerful feature.

Verdict

★★★☆☆



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Diamond FireGL1

price	company	telephone	web
£695	Diamond Multimedia	01189 444 400	www.diamondmm.co.uk

pc only

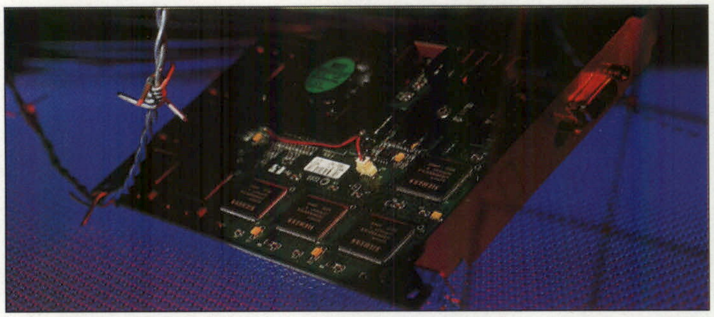
Most people are familiar with Diamond for its consumer, rather than its professional products, but the FireGL1 is targeted very much at the professional user. Like its Evans & Sutherland and 3DLabs competitors, the card appears widely in workstations sold by the top names.

The review model is a PCI card, although it comes in an AGP version too. Unlike most Diamond cards, this one only works under Windows NT. It comes with multi-threaded OpenGL drivers (for multi-processor systems) and has optional optimised SIMD drivers for Pentium III processors.

It has a maximum resolution of 1920x1200, which is enough to drive a 24-inch monitor. Its 250MHz RAMDAC combined with its 256-bit memory access placed its performance in the upper half of the table. This represents a great starting place for NT owners looking to move into OpenGL graphics.

Verdict

★★★★☆



3D Labs Oxygen GVX1

price	company	telephone	web
£763.75	3D Labs	01784 470 556	www.3dlabs.com

pc only

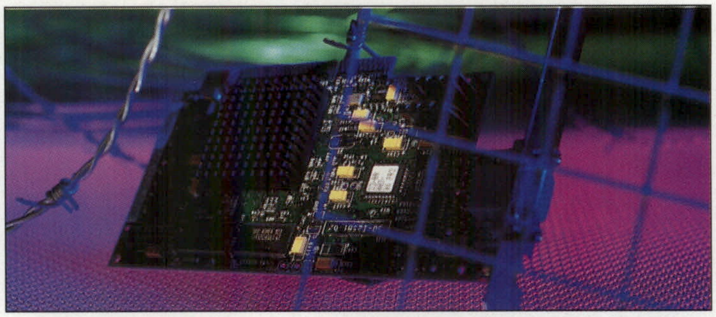
While many cards concern themselves purely with the generation and painting of 3D pixels, this powerful card also takes care of the underlying geometry. This has traditionally been the domain of the most expensive cards until now, and the separate engine required to do so accounts for this board's significant price tag.

The GVX1 provides impressive rendering performance. Its *Viewperf* score rates it only behind the GeForce boards, whilst its real-world OpenGL animation speed is as fast as either of them. You can also put up to eight GVX1 cards into a single machine, giving you a potential multi-screen desktop area of 8192x3072.

Like its little brother, the VX1, the GVX1 features optimisations for Pentium III and AMD's 3D Now! processors and AutoCAD. It also provides additional benefits that will enhance your final 3D rendering performance.

Verdict

★★★★½



How we tested the cards

PC Tests

There are two important aspects of a graphic card's performance: its 2D and 3D capabilities. 2D is mainly expressed in terms of its refresh rate at a given resolution. The higher the rate, the more stable the picture and the quicker the screen redraws. We chose 1280x1024 as our standard resolution, and quoted the refresh rate at this level.

For the 3D, it depends far more upon the drivers and additional processing functions. Under Windows 95/98 we used *3DMark* which runs a variety of DirectX simulations to achieve an overall rating. Under NT, we used *Viewperf 6.1*, which again uses a variety of tests to simulate real-world usage. In both cases, the higher the number, the better the performance.

As a final real-world NT test, we ran a complex 300 frame *Lightwave* animation at top speed and timed how long it took to play this OpenGL 3D clip. The shorter the time, the better the card.

Mac Tests

For the Mac tests we compiled a rigorous set of tasks for both cards to complete. First there was the *Photoshop* scroll, a 1152x15,000 pixel image. With the monitor set to 1152x870 pixels and 24-bit colour, we timed how long it took to scroll down the entire 15,000 pixel file. Anything under 20 seconds is fair, with less than 15 being quite exceptional.

Then we asked each card to scroll a 30,000 word *Nisus Writer* document, with under 10 seconds being the Holy Grail. For the 3D tests we used *Gerbils!*, a freeware program which animates QuickDraw 3D graphics at a range of resolutions and complexity.

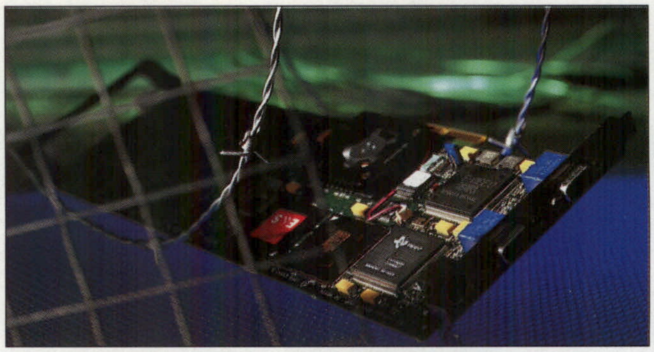
We ramped up the resolution to 1152x870 and went for the Hardware Complex setting to give each card a mammoth QuickDraw 3D environment to animate. Under this kind of test, anything over 10 frames per second is excellent and over 20 is God-like.

A word of warning

When you move into the high end, where you can end up paying £700 or more for a graphics card, you may encounter a new breed of cards that consume so much power and give off so much heat that they require onboard cooling fans. An example of such a card is the E&S Tornado 3000, which actually uses an additional PCI slot just to draw sufficient power to run the card.

However, these cards appear to be driving PCI/AGP architecture of normal PCs beyond their limits, and we encountered stability problems with the Prophet and Tornado 3000 cards. If your system isn't the latest spec, you might be better off choosing a less demanding card.

On the other hand, if you have a workstation end system (with dual processors, perhaps) such cards may present a more likely option. We brought the E&S Tornado 3000 for testing but decided not to rate the card as it had problems with both our testing motherboards, possibly due to the amount of power it requires.



A Rolls-Royce amongst graphics cards? The Evans & Sutherland Tornado 3000 weighs in at £1274.88 and requires two motherboard slots.

ATi Nexus 128

price	company	telephone	web
£199	ATi Technologies	01628 533 115	www.atitech.com

only mac

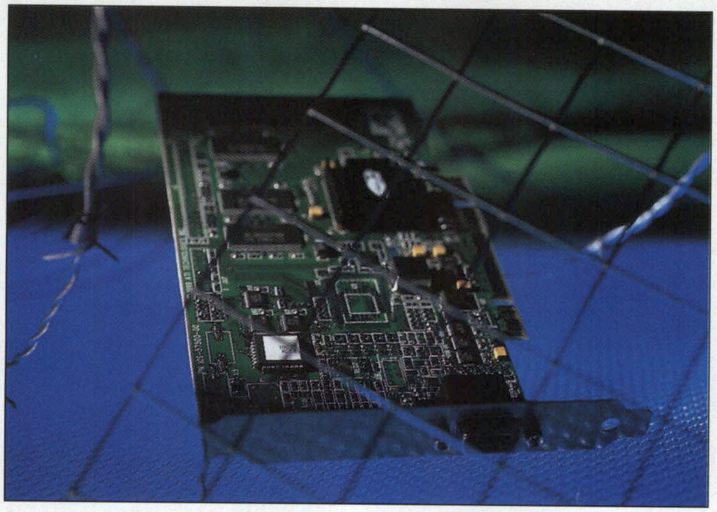
The Nexus 128 is basically a revamped version of the graphics card that comes with the PowerMac G3 and entry-level G3s. However, this version comes with 32MB of VRAM. The card is based around a RAGE 128 graphics processor with 128-bit memory bus. It supports and accelerates QuickDraw, QuickDraw 3D RAVE, QuickTime, OpenGL and MPEG-1 graphics. It supports resolutions up to and including 1920x1440 in glorious 24-bit colour with refresh rates of up to 106Hz.

Performance-wise, the ATI Nexus isn't the fastest card out there, but it does cover the board. 2D performance was much improved over the G3's built-in card, but could be faster. 3D performance is where the card shines though as it averaged 12 frames per second in our tough *Gerbils!* test, and a credible 35 frames per second in *Quake II*.

The Nexus 128 is a good graphics card, but it needs stronger 2D performance to be a must buy. ATi regularly updates its drivers to improve performance and adds new features so you can be sure of continued support if you buy this model.

Verdict

★★★½



Formac ProFormance 3

price	company	telephone	web
£222	Formac	0181 533 4040	www.formac.co.uk

only mac

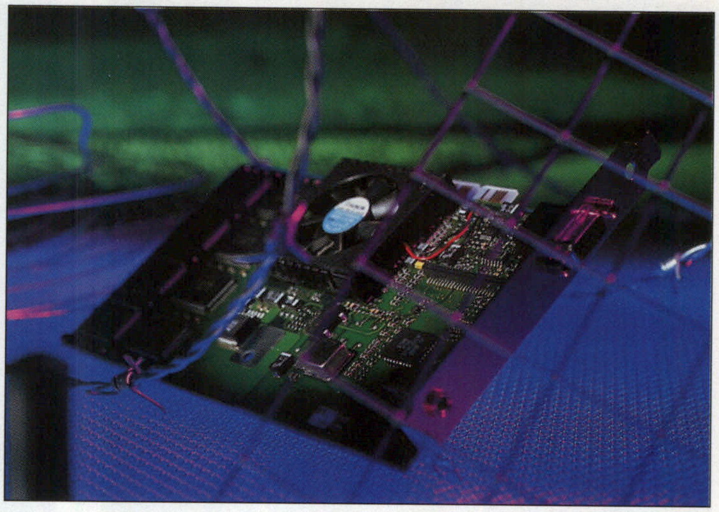
Formac is the name for speed as far as Mac cards go, and the ProFormance 3 offers a big leap over previous cards. It's based around the Permedia 3 128-bit graphics chip and comes with 16MB of VRAM as standard. The ProFormance 3 supports resolutions up to 2000x2000 pixels at refresh rates up to 125Hz.

It accelerates QuickDraw, QuickDraw 3D RAVE, QuickTime and MPEG-1 graphics. However OpenGL acceleration was not supported at the time of writing, although Formac is busy working on drivers to enable this. By the time you read this, the ProFormance 3 should fully support and accelerate any OpenGL application. In terms of speed, this is just about the fastest Mac graphics card you can buy at the moment, and in 2D tests it proved to be almost a third faster than the ATi card. QuickDraw 3D performance in *Gerbils!* was also pretty fast, averaging out at 15 frames per second.

The ProFormance 3 is an excellent card, but the heavier price tag and current lack of OpenGL support seriously dents its value for money.

Verdict

★★★★

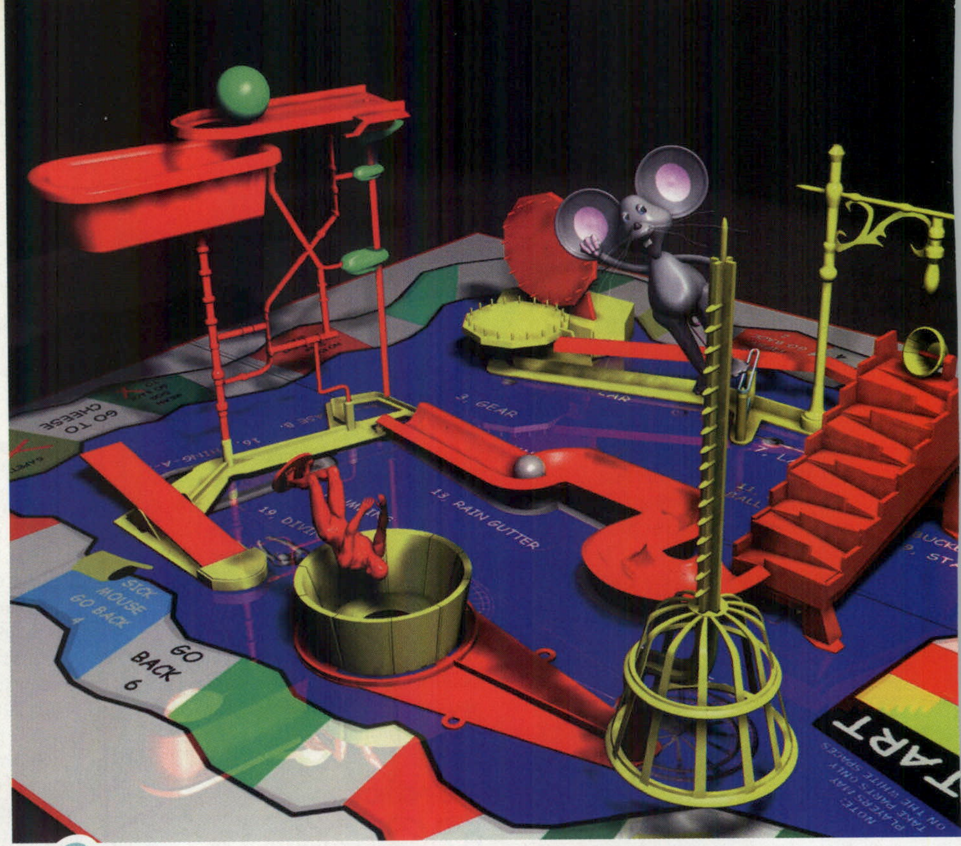


The specs compared

Our at-a-glance guide to the cards under review

Cards	Support	Driver Support	Chipset	RAM	Max 2D Res	Refresh rate *	3D Mark	3D Animation	Viewperf Score	Score	Interface
PC											
ATi All-in-Wonder 128	Win NT 4, 95/ 98	OpenGL, DirectX	ATI Rage 128 GL	16MB	1920x1200	125Hz	2852	16s	5.54	3.5	AGP 2x
3DFX Voodoo3 3500	Win 95/98	OpenGL, DirectX, Glide	Voodoo3	16MB	2048x1536	100Hz	2820	No NT	No NT support	3	AGP 1x
Guillemot Prophet	Win NT, 95 & up	OpenGL, DirectX 7	Nvidia GeForce 256	32MB	2048x1536	120Hz	Untestable	8s	48.75	3.5	AGP 2x/4x
ELSA Erazor X	Win NT, 95/98	OpenGL, DirectX 7	Nvidia GeForce 256	32MB	2048x1536	120Hz	2648	8s	48.79	5	AGP 2x/4x
3D Labs Oxygen VX1	Win NT, 95 & up	OpenGL, DirectX	Glint R3	32MB	2048x1536	120Hz	2406	15s	9.219	3	AGP 2x
E & S Lightning 1200	Win NT 4, 2000	OpenGL, DirectX 6	REALimage 1200	31MB	1280x1024	85Hz	No Win 98	12s	11.64	3	AGP 2x
Diamond FireGL1	Win NT4	Open GL	IBM 256-bit GR	32MB	1920x1200	85Hz	No Win 98	9s	12.38	4	PCI
3Dlabs Oxygen GVX1	Win NT 4	OpenGL	Glint Gamma G1 & R3	32MB	2048x1536	120Hz	No Win 98	8s	24.81	4.5	AGP 2x
E & S Tornado 3000	Win NT 4, 2000	OpenGL, DirectX 6	REALimage 3000	62MB	1920x1200	120Hz	No Win 98	n/a	n/a	n/a	AGP 2x
Mac											
ATi Nexus 128	Mac	QuickDraw 3D, OpenGL	RAGE 128	32MB	1920x1440	n/a	n/a	12fps	n/a	3.5	PCI
Formac ProFormance	Mac	QuickDraw 3D	Permedia 3	16MB	2000x2000	n/a	n/a	15fps	n/a	4	PCI

* 1280x1024, 24/32-bit, not tested on Mac cards



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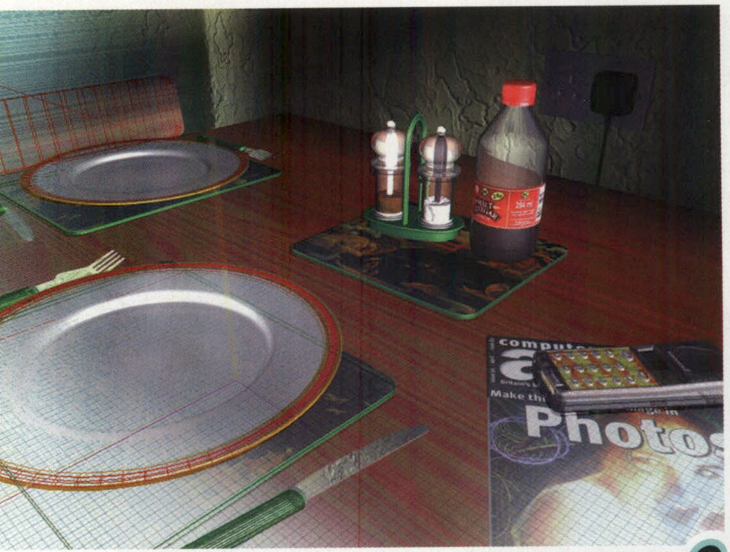

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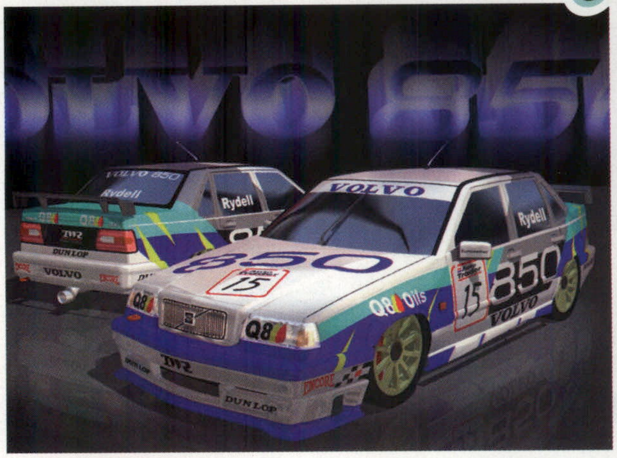

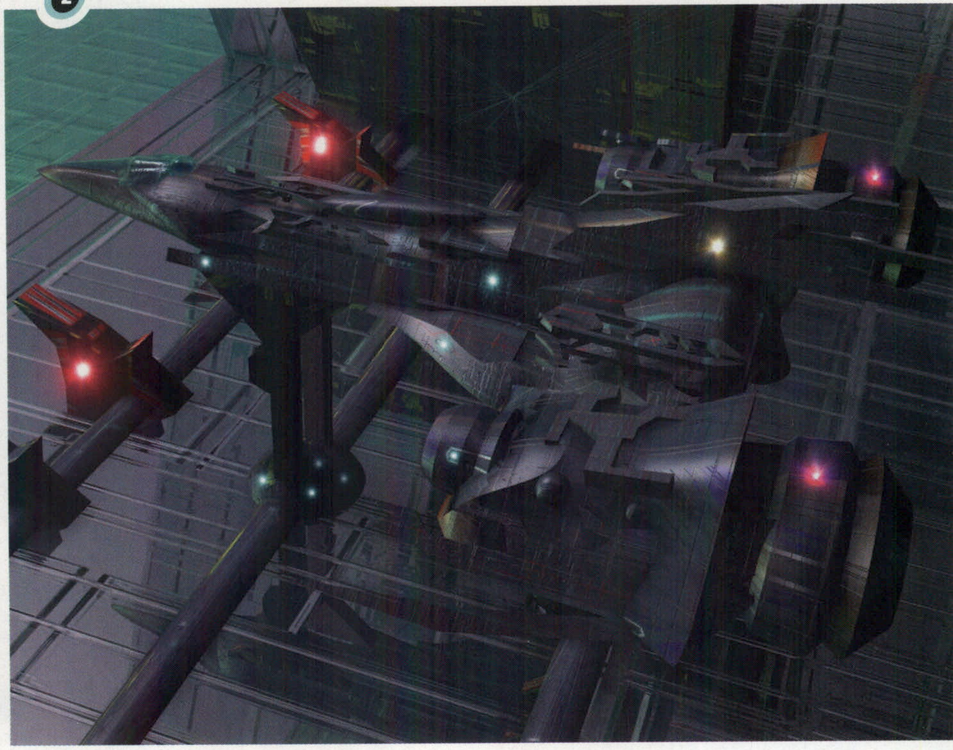

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exposure

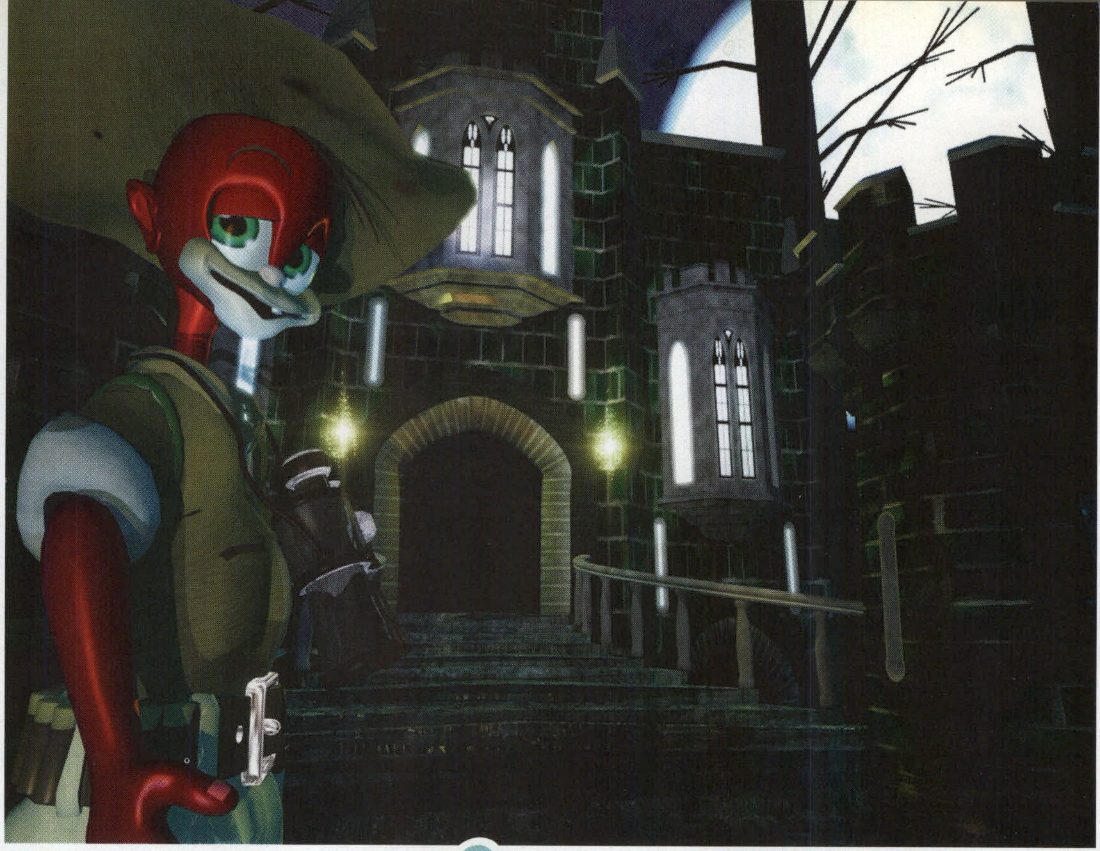
This issue: 3D racing cars, games, skyscrapers and wildlife

① Pepper and Volvo (above)

Lee Norton **t** 01253 313 397 **w** www.animation-exwyzee.com

Lee, who recently graduated from Blackpool and Fylde College, is now busy with Exwyzee, his design consultancy studio dedicated to animation and 3D modelling. Both images were modelled on a AMD K6-2 350. For Pepper, Lee explains that he was after an everyday picture of a kitchen. "This portrayed a working kitchen; something you would see around tea-time," he says. "It was entirely modeled in *form•Z*, using *Photoshop* for image maps. The coasters are true size. I pinched them from my mum's house and just scanned them in!"

Volvo depicts Rickard Rydell's winning touring car from 1997. "It was a college project modelled in *Lightwave 5.6*," says Lee. "The polygon count was silly, approaching 800,000! But it was finally rendered out on Silverstone race track at 11 minutes pf – 800 of them!"



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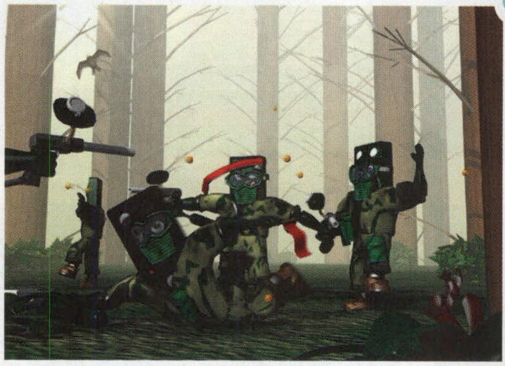
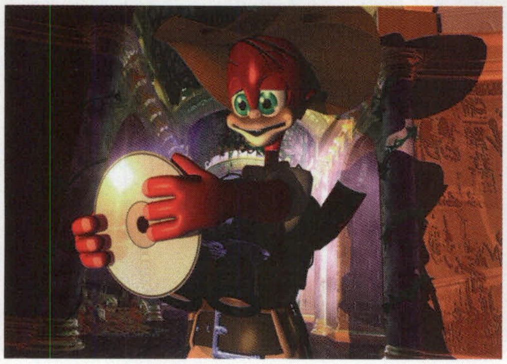
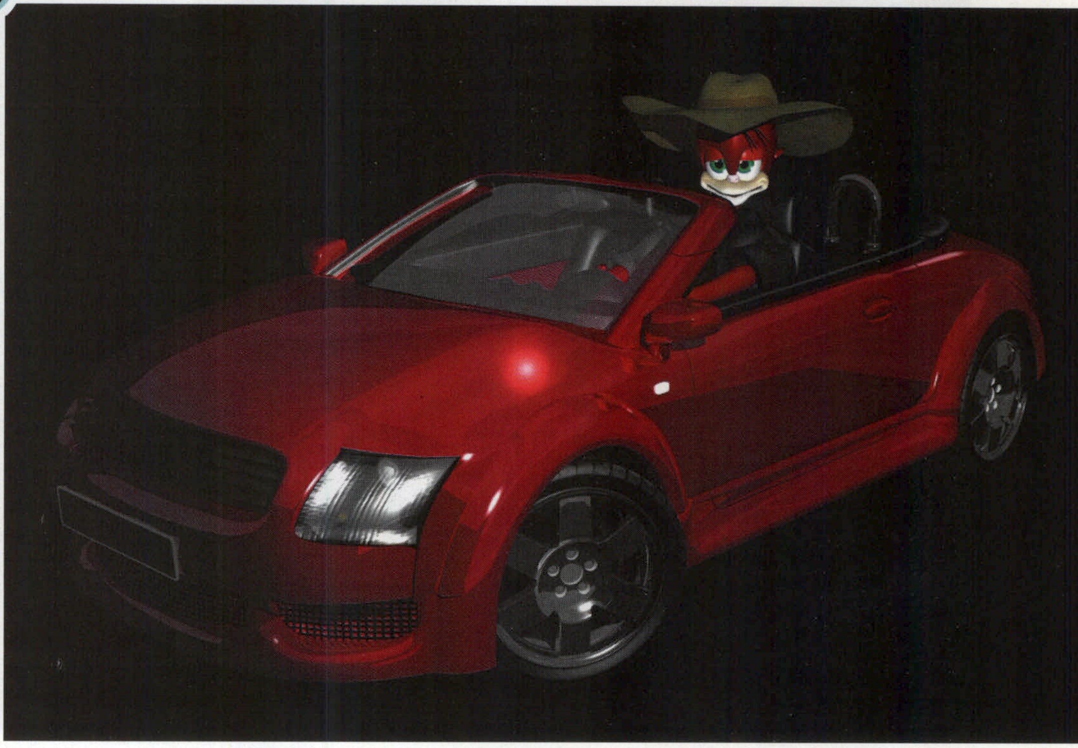






② Mouse Trap and Craft (from top)

Lee Everett **t** 020 7435 4179 **e** lee@attic.co.uk

"These images from my portfolio show ideas that I wanted to expand upon," says Lee, "paying a lot of attention to detail." Based on that infuriating board game of the 70s, Mouse Trap, and a model aircraft, they were modelled in *3D Studio MAX*, a package he was introduced to at college. Then Lee used *Photoshop* to produce the textures for the models, and after the first render the images were cleaned up in *Photoshop* as well.

Lee had no idea that he would be producing art like this when he started college, but after completing his HND in illustration with a new found love for 3D modelling, he joined Attic Media, a multimedia company producing Web sites and multimedia products, based in Hampstead, London.

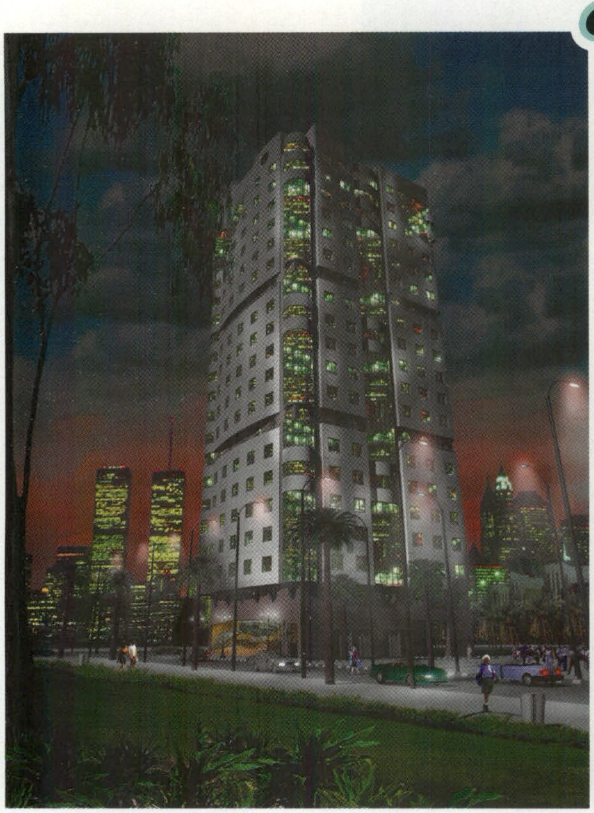
③ House, Corey, New Discovery and Painful Experience

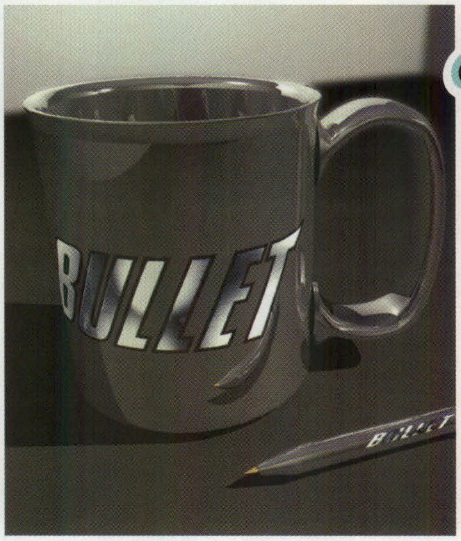
(clockwise from top left) Darren Williams **t** 01865 454 681 **e** darren@domino.com

"All the pictures were produced using *Lightwave 5.5*," says Darren, who works as a senior Web designer and *Flash* developer with Domino Systems in Oxford. "I created them for my own pleasure. They'll probably never be used for anything, but it's all about the love of it. Corey, the main character, was built entirely using metanurbs within modeller. He was quite difficult to build because it was my intention to animate him, so he has a full bone structure.

"The enviroments in which Corey resides were a breeze to create in *Lightwave*. Just simple shapes, textured and tweaked. Corey's car was a complete nightmare to model, however. This was more of a challenge than anything else, I almost gave up on this one. I think *Lightwave* needs to incorporate true NURBS modelling to make tasks like this easier."

4





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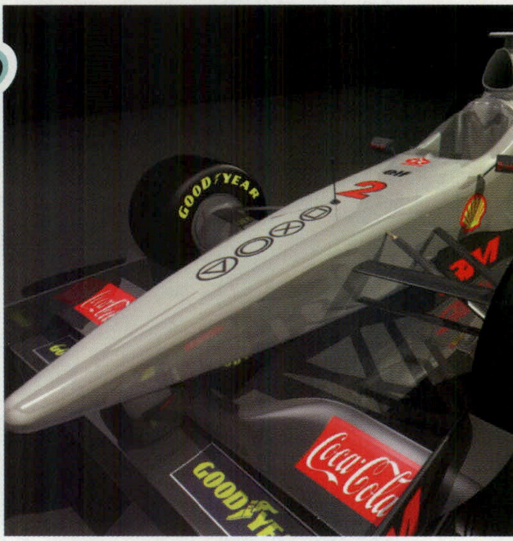


4 Dimitar, Artist1 and Archpen (clockwise from above)

George Tangardjiev *e* archrender@yahoo.com or bgdesign@bgnet.bg

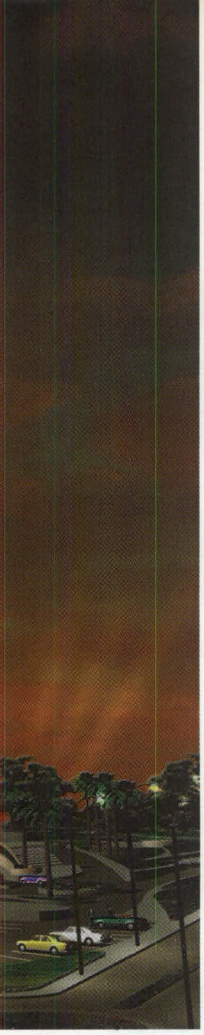
George graduated in 1996, and he currently works as an architect in Sofia, Bulgaria. His work involves drafting designs and 3D modelling. From time to time, he also creates architectural visualisations for foreign companies, using the Internet to exchange information. George taught himself to use the computer after he encountered a computer lab at university. "I thought that if I learnt the software perfectly, I could create good images – but I have never succeeded in creating realistic images with 3D packages alone. He usually produces his images using *AutoCAD R12* and *3D Studio R4*, before manipulating them in *Photoshop*. "I create and render the models using basic lights and no special effects," he says. Then he adds the scenery and lighting in Photoshop, which is George's favourite aspect of the work. "It's where I can express myself creatively," he says.

5 F1 Team Bullet (above)

Jared Evans *e* jay269@hotmail.com

Jared has just completed a BTEC National Diploma in Computer Arts at Sheffield Norton College. He says he loves 3D graphics because of the god-like role that designers play in the virtual world, with control over modelling, direction, camerawork and so on.

The Formula One car was part of his major project, which involved designing a new team called Bullet. At first Jared tried modelling the car from photos in magazines, but he couldn't see all the angles necessary, so he visited Donington Park Museum, which holds around 200 F1 cars. He took about 60 photos and was able to get any shot he wanted. The was modelled in *3D Studio MAX* using patches and touched up in *Photoshop*. A wide-angled camera was also used to give dimension which Jared was really pleased with, as it gives a whole new look to the scene. Jared is now finishing off his portfolio and hoping to find a job in the 3D world.



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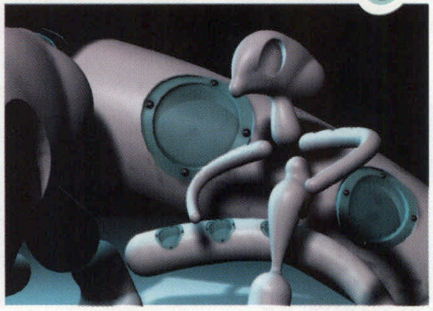

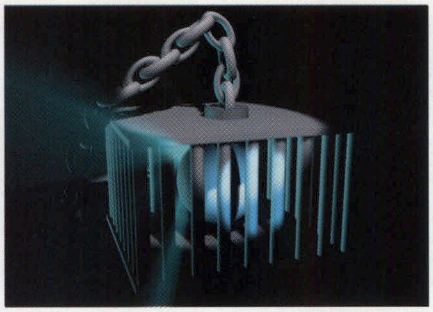

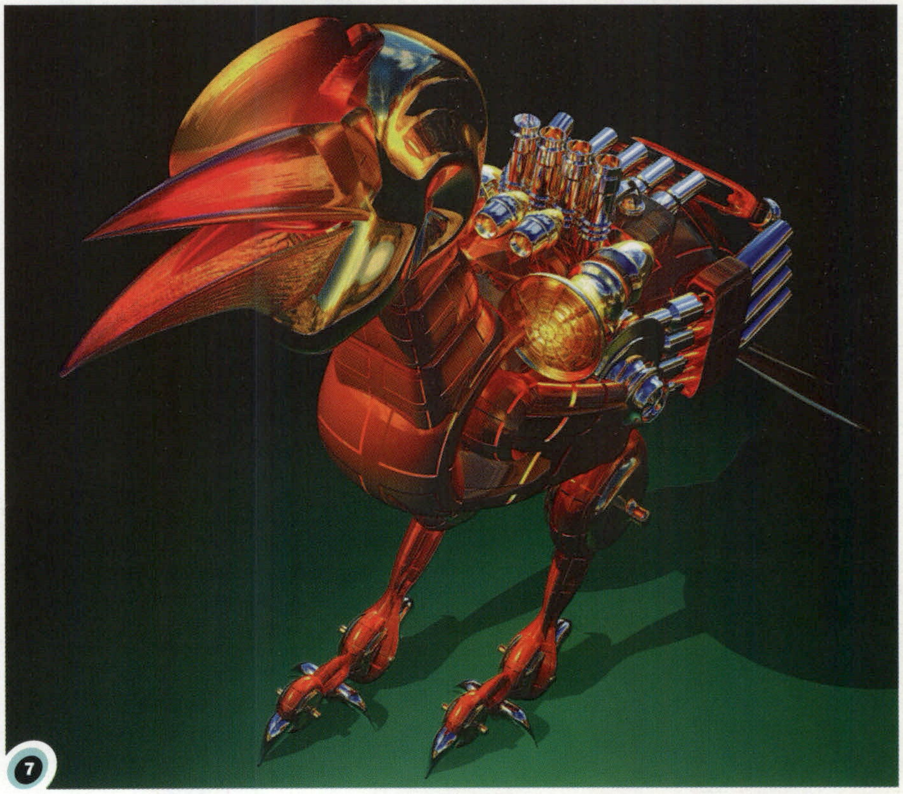

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6 Fathom, Analogues, Not Again and Sparkling... (above)

John Robinson **t** 01685 382184 **e** geoffrey@robinson617.freeserve.co.uk

John was spotted by film maker Peter Jones when his work was featured in Exposure in Computer Arts 34. Since then, John has linked up with Peter to work on commercials for future digital TV channels.

"With my talent and skill level, Peter is opening his eyes to graphic design as well as film," says John, who usually works in partnership with his father, Geoff, under the company name Robinson. Geoff is a fine artist, while John works on the computer. Most of their artwork has been produced for stock image companies like Digital Vision. John has also been studying for a BTEC in computing, although he says the course didn't cover the artistic side of computing. "I've taught myself all of that," he says. John uses *3D Studio MAX* as a rule, although he also uses *Photoshop* to manipulate Geoff's photographs and drawings.

7 Hornbill (above)

Sharkawi Che Din **e** sharkawichedin@hotmail.com

"The Hornbill is a bird that has become the symbol of Sarawak," explains Sharkawi Che Din, lecturer in Computer Animation at the University of Malaysia. He's currently planning to create a series of 20 3D illustrations reflecting different aspects of Sarawak life, such as craft, culture, natural heritage, flora and fauna.

This particular image was created using *form•Z* and *Ray Dream Studio 5.02* on a PowerMac 8500/G3 upgrade. Sharkawi has great faith in the possibilities open to artists working with modern technology: "Working in virtual environments enables me to create absolutely anything I've envisioned. On PC I prefer *3D Studio MAX*, and *Ray Dream Studio* or *Electric Image* on the Mac. I tend to create profiles with 3D Vector drawings in *FreeHand* or *Illustrator*, and import these to 3D packages for skinning and extruding," he explains. ca•s

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software

Discover the latest and best in 3D software packages

rating system:

- ✪✪✪✪✪ Top notch
- ✪✪✪✪ We like it
- ✪✪✪ Worth a look
- ✪✪ Bit dodgy
- ✪ Save your cash

Cinema 4D XL v6

new for pc new for mac

on the CD • on the CD • on the CD •

Now you can experience the joy of six as Maxon takes the wraps off the latest version of *Cinema 4D XL* – and it's set to give the mid-range 3D market a real shake-up

preview

price
£1469

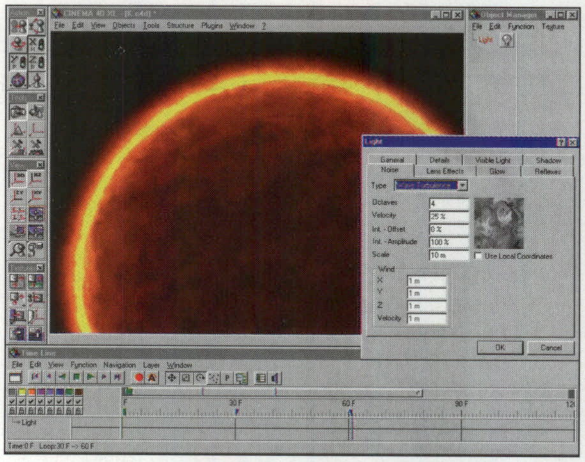
company
Maxon

telephone
HiSoft 01525 718 181

web
www.cinema4d.com

features

- ☆ Hyper NURBS
- ☆ Motion blending
- ☆ Meta balls/splines
- ☆ New lighting model
- ☆ Area and tube lights
- ☆ Interactive deformers


CINEMA 4D XL
File Edit View Objects Tools Structure Plugins Window ?
Object Manager
File Edit Function Texture
Light
Time Line
File Edit View Function Navigation Layer Window
30 F
60 F
90 F

Light

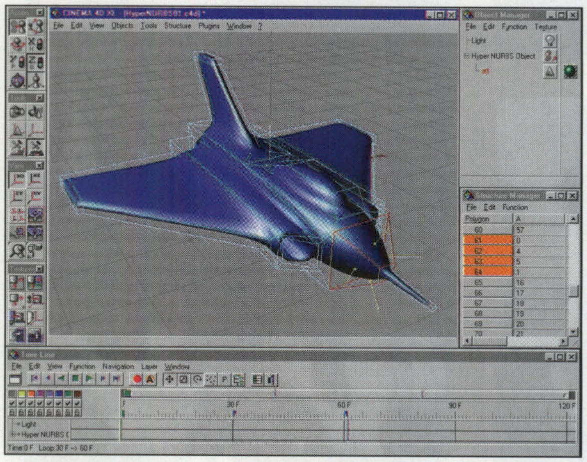
General | Detail | Visible Light | Shadow
Noise | Lens Effects | Glow | Reflexes

Octaves: 4
Velocity: 25 %
Int. - Offset: 0 %
Int. - Amplitude: 100 %
Scale: 10 m
☐ Use Local Coordinates

Wind
X: 1 m
Y: 1 m
Z: 1 m
Velocity: 1 m

OK Cancel

A new lighting system will provide all sorts of exciting new options. Here a volumetric glow can be seen with animated fractal noise.



***XL 6*'s HyperNURBS are Maxon's take on Subdivision Surfaces and look like a superb addition to the program.**

Cinema 4D XL v6 is about to be unveiled, and the new version represents a major upgrade to the German 3D animation package. Developer Maxon has been hard at work, adding new features and refining current tools and interface elements.

One of the main changes will be to the timeline/time manager which used to be split between two palettes, one for the keyframes and another for the transport controls. It's now a single window, which makes things much tidier overall, but it also offers some great new features, including user colour coding, linked selection in the objects manager, as well as audio waveform display.

The animation engine itself has been revamped and there is some fearsome looking technology being added, that could really give the mid-range 3D market a shake up. *XL 6*, code-named *Amber*, will feature non-linear animation, the sort touted by Avid as a major part of its forthcoming high end 3D package, *Sumatra*.

XL's 'motion blending' will enable you to animate object and character movements as discreet actions or sequences which can be overlaid, blended and combined in multiple layers to produce the final sequence. Users have control over the way two or more overlapped motion sequences will blend and you will be able to keyframe the blending transition, with the timeline displaying a visual guide in the form of an editable curve.

Animation control now extends to the point level, which has some rather useful applications. In previous versions, point animation would be useful, though possibly a bit of a novelty. However, *XL 6* will feature a new modelling system called HyperNURBS, a subdivision surface technology not unlike *Lightwave*'s MetaNURBS. Because the modelling and animation is integrated in *Cinema 4D*, the HyperNURBS object can remain in its editable form throughout animation, which is where point animation will be an indispensable tool and a very important capability for character animation.

XL's lighting system has been totally rewritten and now features a greater selection of light types including very fast Area lights and Tube lights. The volumetrics have been improved, while feature animatable fractal noise for realistic smoke effects and shadow maps can now be set to much higher resolution for better quality soft shadows.

More modelling tools can be found in the shape of Metaballs and MetaSplines. Point animatable splines and 3D objects can be used to generate the blobby surfaces which will remain fully editable as you animate. In addition, a new keyboard shortcut system will be implemented, making navigating the interface much simpler. *XL 6* looks likely to improve on the current version, but existing users won't be left out in the cold. Anyone who owns current versions of any of the *Cinema 4D* family will be able to upgrade to *XL 6* at the difference in price. **ca>s**

Explosive materials Cinema 4D's new animation effects

New animation effects in *XL 6* include an improved explode function that emits fragments with depth (rather than flat polygons). The fragments can trace complex animatable motion paths.

New deformers will provide proper control over effects such as bend, twist and taper. They are no longer treated as animation effects requiring keyframes, but will have on-screen control handles for quick editing. They will, of course, be fully animatable.

Also implemented will be a new hierarchically instancing system that will let you control and animate multiple 'clones' of a master object, reducing RAM overheads and speeding rendering. Any changes to the master will be reflected in the clones, even if they have themselves been individually edited.

Maya 2.5

pc only

Alias|Wavefront builds the future of animation by adding cutting edge painting technology to its 3D powerhouse, with flexibility being the order of the day

preview

price	£1845 Builder £4620 Complete
price	£9850 Unlimited
company	Alias|Wavefront
telephone	07000 832 439
web	www.aw.sgi.com

features

- ☆ New 2D canvas
- ☆ Natural Media Brushes
- ☆ Paint 3D geometry in real time
- ☆ Paint 2D effects on 3D model
- ☆ Multi-threaded IPR
- ☆ *Maya Builder* for games

Hot on the heels of version 2 comes Alias|Wavefront's latest version of its 3D animation powerhouse, *Maya 2.5*. *Maya* is an integrated 3D production environment developed from the ground up to be as powerful and flexible as possible, and in the short time it has been on release *Maya* has proved itself a major contender in the high end 3D stakes.

It is particularly suited to character animation, sporting some of the best tools available, but it also has a sublime dynamics system that can simulate both rigid and soft bodies with ease.

While other companies are content to rest on their laurels, Alias|Wavefront has bulldozed forward, each new version of *Maya* offering major improvements over the previous one. This latest version follows the not insubstantial version 2, which added Fur and Cloth simulation and IPR (Interactive Photoreal Rendering) to the already burgeoning *Maya* toolset.

With *Maya 2.5* Alias has developed even more amazing technology, with Paint Effects. It offers a 2D canvas for painting, using artistic and natural media brushes, the type you can find in a 2D paint program. This in itself is a great productivity booster, but you're not just limited to 2D canvases.

Maya 2.5 lets you paint in real time, directly on to your models and preview using them the IPR renderer. You can also smudge textures and add effects such as glows simply by painting. Yet the *pièce de résistance* is yet to come. With *Maya 2.5* Paint Effects you can paint complex geometry into your 3D scene as easily as you would in 2D. It is particularly impressive when you see dense grasses, bushes and flowers being painted on to a hillside in seconds. Geometry, like the 2D brushes, is rendered interactively as you paint and can even be animated using dynamics for realistic wind effects.

With paint effects you can also add fire, rain or smoke to your scene and it's as simple as painting with a brush. Also new are the Polygon LOD (level of detail) and poly reduction tools, while the IPR will be multi-threaded to enhance previewing on multi-processor machines, and final render speed will show improvements of up to 20 per cent on Pentium III Xeon processors. *Maya 2.5* will also ship with extra Dynamics ClipFX Libraries such as Lightning, Fireworks, Ripple, Shatter and Surface Flow.

Those looking to the high end will find much to admire in Alias|Wavefront's latest offering. The versions and pricing remain the same with *Maya 2.5 Complete* expected to fetch around £4620 and *Unlimited* version a whacking £9850, though do you get all the whizz-bang high end features such as Matchmoving, Fur, Cloth, extra rendering licences and Advanced Modelling Tools (Global Stitch etc). Those with current *Maya* maintenance contracts will receive the upgrade free, with upgrades from *Maya 2* starting at £320. *Builder* is expected to ship at around £1845. **ca>s**

Master Builder Playing games with *Maya*

As well as *Maya 2.5*, Alias|Wavefront will introduce *Maya Builder*, a version of the package honed for games developers, featuring a low price to match.

Stripped of NURBS, advanced animation controls and rendering, *Maya Builder* offers a Polygon-based modelling and animating environment ideally suited to the creation of game characters and levels. It includes a simple two-bone IK solver for characters as well as supporting Artisan and MEL.

The price is still a bit on the high side at around £3000 and many animators will find the two-bone IK system extremely limiting, especially for those monsters with multiple jointed limbs or long tentacles!

Paint Effects allows users to paint into their scene in 3D with interactive updates via the IPR renderer.

Softimage|3D: Sumatra

Animation goes non-linear with *Sumatra*, the next generation 3D software package that represents a fightback by the creators of *Softimage*

pc only

preview

price £TBC

company Avid Softimage

telephone 020 7307 8000

web www.softimage.com

features

- ☆ Non-linear animation
- ☆ Completely new interface
- ☆ Glassworks' Fur shader
- ☆ Multi-pass rendering
- ☆ Interactive photoreal rendering
- ☆ Shading network

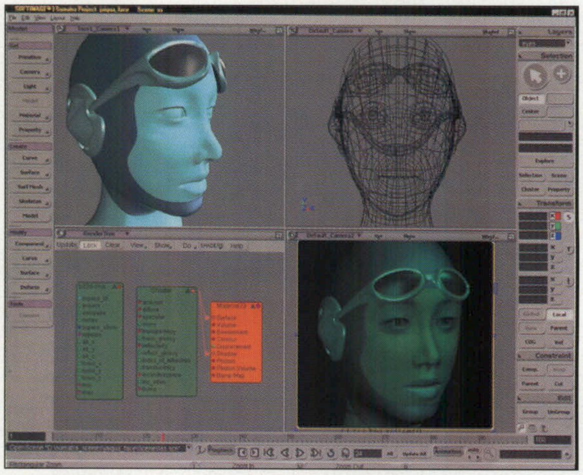
Sumatra, the code name for Avid's next generation 3D software, is a major release in the 3D arena. Avid's current software, *Softimage|3D* has been the de facto standard in the film industry for many years, but has recently been shaken by the likes of Alias|Wavefront's *Maya* and even *3D Studio MAX* and *Lightwave 3D*.

Famous for bringing countless characters, monsters and dinosaurs to life on our screens (the BBC's *Walking with Dinosaurs* was created by Framestore using the software), *Softimage|3D* has been favoured by many top studios for high pressure, high performance, professional 3D work. It has been well over ten years since its inception and after a two-year wait, Avid Softimage will at last release its replacement in the form of *Sumatra*.

Sumatra will feature many exciting advances, not least of which will be NLA (Non-Linear Animation). In one form or another, NLA has been available in various 3D packages for some time and Avid has been criticised for making such a big deal over it. However, if the pedigree of *Softimage* is anything to go by you can bet that *Sumatra*'s NLA will be like no other available. Swarm and herd patterns will come in handy, as will the ability to copy motion from one animation model to another.

Avid is certainly keen to stress that it will be well worth the wait. The interface has, as you would expect, received much attention and will be user customisable. As you can see from the screen shots, it is certainly a lot slicker looking than *Softimage|3D*, which is infamous for its workstation-like inflexibility. It should not prove too drastic a change for existing *Softimage* users weaned on the previous version. *Sumatra* will sport a more subtle sculpted look and users will be able to modify the layout of the interface to suit their individual needs and the animation task at hand.

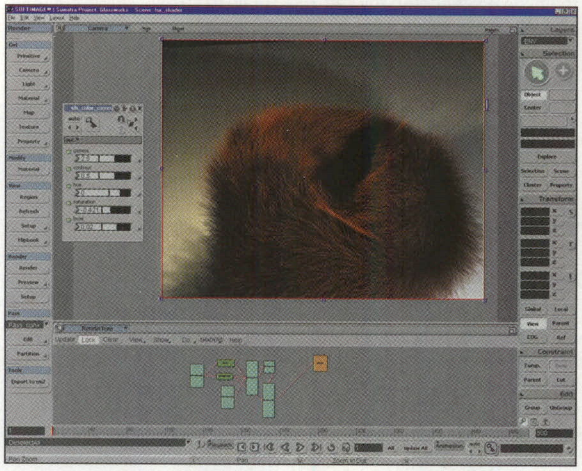
As for rendering, you can expect the rendering engine to offer a much greater degree of flexibility, when it comes to previewing and final output. It will now be possible to render multiple passes of an animation (such as shadow and alpha passes), by activating simple render flags. This should make post production and compositing work a great deal simpler.



The improved rendering options in *Sumatra* give you the opportunity to preview renders with shadow and alpha passes so you can see the results of your work on the fly.

Sumatra will feature a visual shading and rendering network, similar to *Maya*'s Hypershade/Hypergraph, which should make producing intricate and complex materials and rendering effects intuitive and simple. Previewing a scene will also be much improved thanks to the interactive photoreal rendering (like *Maya*'s IPR). Textures, shadows, reflections and even true motion blur can be interactively previewed as you make changes.

Only time will tell if it's too little too late, though. Two years is an awfully long time in the computer graphics industry, but you can bet that this latest 3D giant probably won't be a dinosaur.

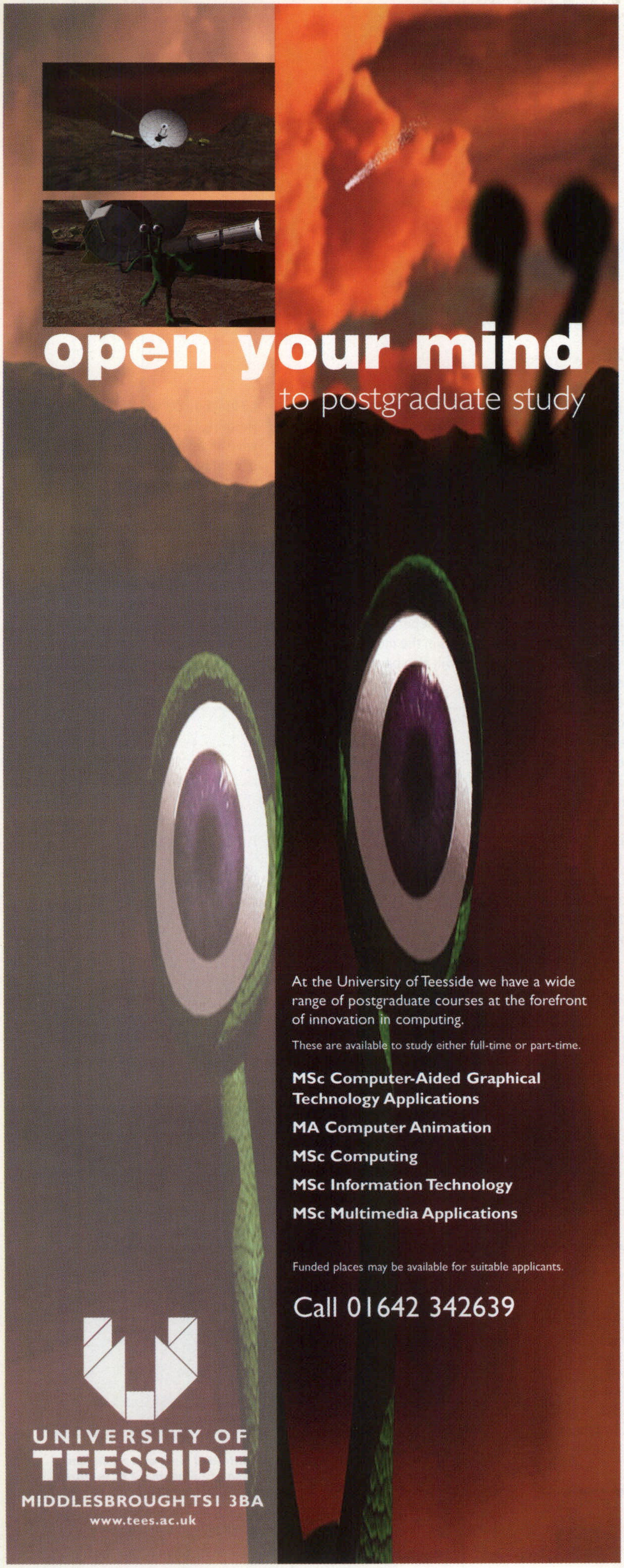


The new interface certainly looks good and will be user customisable to a larger degree than previous versions. *Sumatra* will also ship with Glassworks' Fur shader seen here.

Under fire Critics lambast Avid

Criticism has been laid at Avid's door (and that of Microsoft, the previous owner of the company) for leaving the release so late in the day when rivals such as Alias|Wavefront are already into version 2 and beyond with their advanced 3D software packages.

Alias already claims to be 18 months ahead of its rivals in terms of research and development, but it's the sheer market presence of *Softimage* and the dedication of its user base that has kept people interested in *Sumatra* and stopped many from jumping ship to *Maya*, the 3D package from Alias|Wavefront that has emerged as a real rival for *Softimage*.



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Lightwave 6

new for pc
new for mac

Packed with a range of impressive new features, Newtek prepares to take on the 3D big boys with the imminent release of *Lightwave 6*.

preview

price
£1595

company
Newtek

telephone
020 7437 1486

web
www.newtek.com

features

- ☆ Radiosity & Caustics
- ☆ Integrated HyperVoxels
- ☆ Point selection sets
- ☆ MetaNURBS in Layout
- ☆ Improved IK & Bones
- ☆ Skelegons in Modeller
- ☆ Surfacing in Modeller
- ☆ Multiple viewing panes in Layout
- ☆ Multiple cameras
- ☆ UV mapping
- ☆ User Hot Keys in Layout
- ☆ Customisable interface
- ☆ MetaNURBS point weighting
- ☆ New motion controls and function curves

Users of *Lightwave 3D* will be in for a treat when Newtek releases version six of the animation package. It's due on sale as you read this and Newtek intends to give the big boys a run for their money because *6* (codenamed *Purple*) has a feature set to die for.

One of *Lightwave*'s major advantages over its various competitors has been its modelling system, which is extremely versatile even though it is primarily polygon-based. It has had subdivision surfaces, aka MetaNURBS, long before the current fashion, but the new MetaNURBS will have some amazing features.

Point weighting will allow you to harden or loosen edges and corners without adding any extra geometry and there will be shaded feedback in the form of a coloured gradient to aid you in visualising the weighting values. The new symmetry tool will automate the creation of symmetrical objects, in most cases negating the need for the current Mirror/Merge method.

Many of the tools and functions, such as Bevel for example, will operate interactively, allowing you to see the effects 'live' as you drag your mouse. In fact the distinction between the two halves of the program will become blurred as features become common to both. For example, the Surfaces panel will be available in the Modeller as well as in Layout. And, importantly, Layout will be able to open and render MetaNURBS objects directly, complete with control over tessellation.

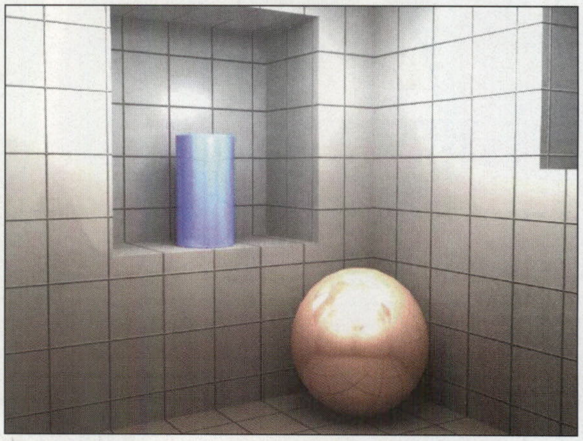
The .LWO model format has also been revised, allowing it to store more information such as multiple morph targets, and the infamous point limit has effectively been removed. Modeller's layers system has been souped up too, with a new layers palette and unlimited sub-layers.

Layout has improved shaded display with Reflections, Lens Flares and Fog visible in OpenGL. The renderer has also been improved to include global illumination (radiosity) and Caustics. The renderer will be faster thanks to the availability of a low level user optimisation feature and the wonderful HyperVoxels system is now fully integrated and no longer an additional plug-in.

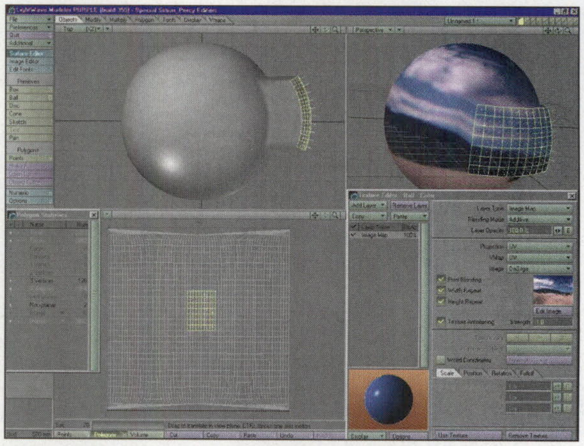
UV texturing will be available for the first time, and the Surfacing panel will feature huge improvements over the current version, ranging from the simple ability to copy/paste settings from one channel to another, to interactive previews on the material ball to advanced gradient controls. Texture maps are listed in layers and their relative positions can be easily altered. Texture layers will have blending modes, much like in Photoshop, and there will be some degree of image editing available from within *Lightwave* itself.

At long last, *Lightwave* will feature independent motion channels in the motion graph, which will also be augmented by function curves (Bezier, Hermite, Linear etc). This will save animators untold amounts of grief because setting a key in the X rotate channel, for example, will not now automatically add keys to the Z and Y channels. Expressions will also be available to link animation attributes.

Lightwave 6 should be on sale now and upgrade prices will be comparable to those of previous versions.



Global Illumination – ie Radiosity – is available, as seen here in the render, and also includes Caustic effects.



UV mapping is now fully supported. An unfolded view of a mesh can be viewed with selected polygons for absolute placement of texture maps. Note that this texturing is being done in Modeller.

Skelegons in the closet *Lightwave* gets logical

One new feature to be found in *Lightwave 6* is 'skelegons', which allow entire skeleton set-ups to be created from within Modeller, which is a more logical approach than previous editions offered. You will be able to make point assignments to skelegon bones to restrict their influence in very precise ways.

The weighting value is displayed as a shaded gradient on the model, giving you visual feedback. Selected points can also be saved in sets for other modelling tasks such as for creating morph targets. It's not a headline-grabbing feature but the implications run deep within modeller which relies heavily on the user selecting manipulating points.

Being able to save and come back to a point selection group is a feature destined to please many *Lightwave* modellers.

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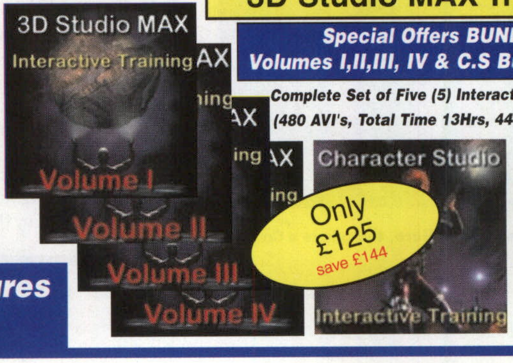
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Amapi v5

new for pc new for mac

on the CD

Amapi celebrates its fifth with a host of new features and tools to delight 3D fanatics

preview

price
£299

company
Computers Unlimited

telephone
020 8200 8282

web
www.tgs.com

features

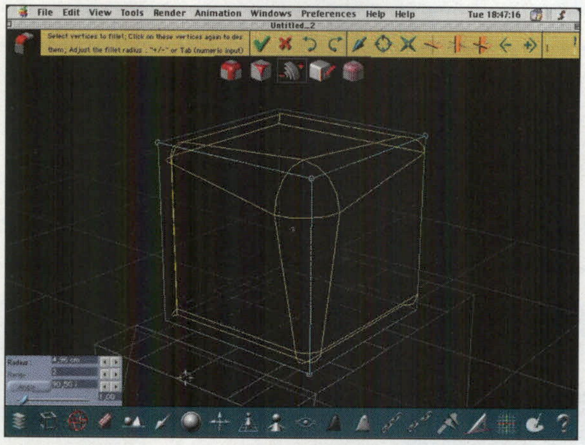
- ☆ MetaNURBS
- ☆ Five smoothing types
- ☆ Enhanced interactivity
- ☆ Free form deformation
- ☆ Live filleting
- ☆ ZAP export

Amapi from TGS is famed for its unusual interface and working methods, though those who have mastered this 3D modelling app really love it. Now version 5 of *Amapi* will thrill devotees even more with its new features and tools.

Bringing it in line with other high-end applications, *Amapi 5* will feature 'Dynamic Geometry', also known as relational modelling. This frees the user to make changes to a model at any point in the modelling process, because *Amapi* retains information about the history of an object's construction. Change the shape of a curve that has been extruded and the extruded surface updates automatically. Even if several further operations are performed on the surface you can go back to the generative curves or polygons and change them. The changes will flow through the history and are reflected in the current object.

New smoothing tools employ five of the most popular algorithms to allow you to refine surfaces and create seamlessly-smooth, continuous meshes from low resolution cages. This works together with Dynamic Geometry to give you MetaNURBS-type modelling, but with five different smoothing methods to choose from. These are Bezier, Doo, Catmul, Loop and Butterfly and each produces different results allowing users a to choose the best method for their model and working methods.

Amapi's Filleting tool palette has been improved to a great degree, allowing you to round and bevel even the most complex surfaces. The new tool is completely interactive, allowing you to see a preview of the rounding on your object. Drag a slider and the rounding radius changes before your eyes. Radii can be specified for the corner vertices and edges independently and the resolution of the rounded edges can be specified precisely. In fact, many of the tools can be operated with interactive feedback, often with a simplified display to speed the previews. The Text tool is just one of the many that have greatly benefited from increased interactivity.



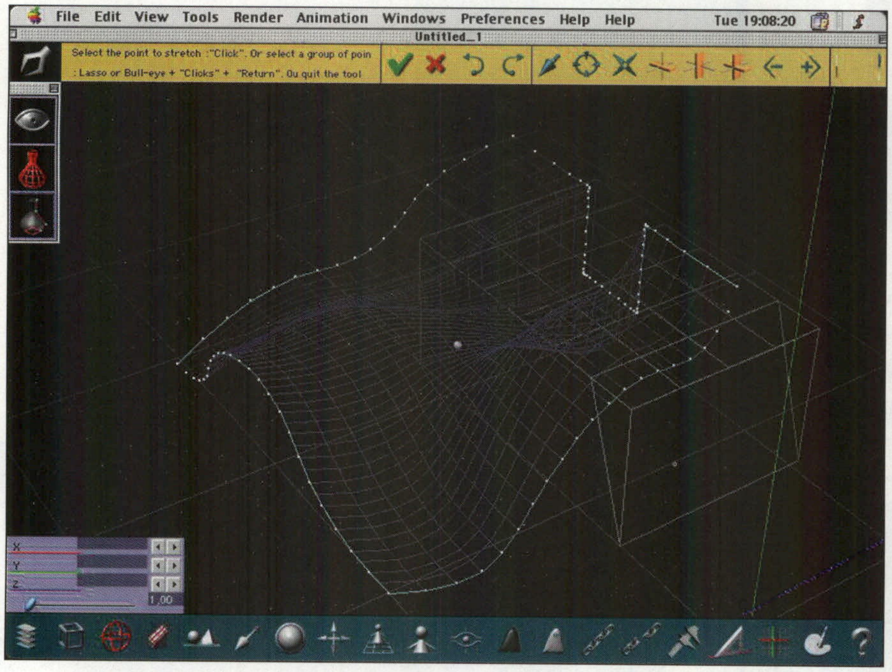
Select vertices to fillet; Click on these vertices again to des them; Adjust the fillet radius : "+/-" or Tab (numeric input)

Amapi's excellent filleting tool provides interactive control over bevelling and rounding. The object's edges and corners can be rounded with different radii.

New deformation tools have been added to *Amapi 5* that allow you to quickly Bend, Taper or Twist an object about any of the three axes of its bounding box. The deformation tools work in tandem with the MetaNURBS features, which also let you perform lattice-like free-form deformations to objects adding greatly to *Amapi*'s organic sculpting abilities. New Tessellation and Decimation tools allow you to increase or decrease the resolution of your model depending on your needs and once more, they operate interactively.

Animation is available in *Amapi* albeit in a limited form, but version five has revamped it to make creating animations simpler than ever. A timeline palette can be added to the bottom of the screen that allows you to set keyframes for translations, scaling and rotation as well as geometry modification, so you can do morphing effects. Curves can be used as paths for more complex motion but things are still as simple as it gets.

The new features will undoubtedly please existing users as well as delight new ones, but *Amapi* still remains as easy to use as ever.



Select the point to stretch :"Click". Or select a group of poin :Lasso or Bull-eye + "Clicks" + "Return". Ou quit the tool

Amapi's support for NURBS includes the creation of Gordon and Ruled surfaces. Here, though, is a Coons surface, its shape is defined by the four boundary curves.

ZAP! Publish 3D content on the Web

A new output format called ZAP is included in *Amapi 5*. This is TGS' proprietary technology for publishing 3D content on the Web. ZAP export produces tiny file sizes that can be easily downloaded by anyone over a network or the Web with the free ZAP player. The 3D model is reconstructed by the player and can be any resolution you like, since the actual polygon or NURBS surfaces are not sent, just the information required to reconstruct them. It is similar to MetaCreations' Metastream format and others are available but since no geometry is sent, the file sizes are minuscule. It's claimed a 5K ZAP file can be reconstituted by the player into a 1.5MB model.

form•Z 3.0.2

new for pc new for mac

This powerful application features animation – but it's the modelling tools that really wow

price
£2100

telephone
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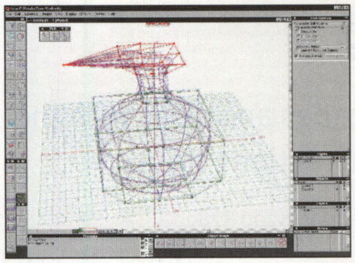
company
Gomark

web
www.autodessys.com

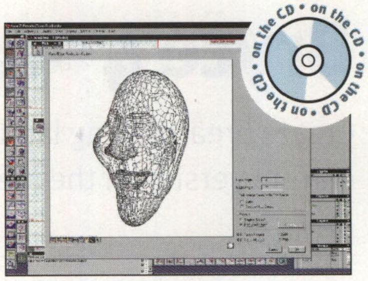
With a potentially bewildering array of modelling, rendering and animation packages available at a huge range of price points, *form•Z* has established itself as a solid and powerful modelling tool aimed squarely at the professional 3D artist. Its US-based developer, AutoDesSys, has steadily listened to user requests and taken time to push new, useful modelling tools and routines into each unhurried update. Rendering tools were introduced with its sister *Radiozity* render engine (now incorporated into the package), and while this is a fully-featured rendering tool, there are still standalone packages that offer far more, and *form•Z*'s transition from the out-and-out modeller to the all-rounder has only been partially complete.

It's only with the most recent integer release – version 3 – that *form•Z* has incorporated a limited form of animation, where only the viewpoints can be animated. Objects (and textures) within the scene themselves remain static, and the animation is created by interpolated views from a number of pre-set camera positions being controlled by keyframes.

While this can be a practical feature, AutoDesSys knows that the hard core of *form•Z* users will still switch to another package specifically for animation, and has concentrated on adding more to that modelling toolset.



Edit NURBS objects with the Edit Controls.



***form•Z* featues a Polygon Reduction tool.**

New to version 3 (and subsequent bug-patch version 3.0.2) are such powerful modelling tools as Nurbz (*form•Z*'s own take on NURBS-support), and patch-based objects. These are complemented by new curves tools and polygon reduction tools for easier modelling and sensible file sizes respectively. *form•Z* is famously difficult to master, due to its complexity and its massive toolset, but some flexibility has crept in, to make the latest version the most friendly. Icons can now be viewed in a variety of styles, and now all the palettes are floating, and feature scroll-down lists for tool attributes.

The standard four-window view is still available, but the new split-pane view means that you can dictate which viewpoint window is shown in which area of your monitor, with only one window tool palette and set of scroll bars. Version 3 is somewhat friendlier, and has important new features for rendering and animation – but the real beauty still lies in the vastly rich modelling tools, which, in this price bracket, are tough to beat.

Verdict

★★★★☆

System requirements

PC Min: *486 ▸ NT 3.5 ▸ 16RAM ▸ Win 95*

Mac Min: *Power PC ▸ Mac OS 7.1.2*

3D Studio MAX R3

pc only

Release 3 of Discrete's all-round package sees great new gizmos and problems fixed

price
£3166

telephone
01483 462 600

company
Discrete

web
www.ktx.com

Some might say that *3D Studio MAX* is the world's favourite 3D package – it's certainly the most talked about. Its £3000 feature set offers something for everyone, from the game designer to the animator to the architect. The latest version, Release 3, consolidates that position to keep up with the times and fix an Achilles heel or two. That means a rebuilt renderer, overhauled NURBS, skinning and boning, new shader plug-ins, a MAXScript Macro Recorder and Non-Uniformally Rational MeshSmooth (or NURMS), among other things.

Indeed, you'll be hard pressed to find an interface item without a new widget or function to play with – and even if you're unsure of what you see, fear not, because the interface is now fully – that's fully – customisable, what with right-click menus and all. Superb.

But far and away the best improvement for *MAX R3* is the rehashed renderer – and a good job too, since it's taken some stick in the past. The plasticky output of old now gives way to 11 brand-new anti-aliasing plug-ins offering dramatically different results, from the Gaussian to the anisotropically shaded. A handful of new shader types for materials augments the solution, including Anisotropic for directional highlights and the soft Oren-Nayar-Blinn; and you can now apply lens flares, depth of field and the like, all interactively.

Another timely fix is in its NURBS features. We're not talking Rhino-standard here, but *MAX*ers will be glad to hear they're faster, trustier and a right-click gives way to Surface Fillet and Loft compound objects functions, among many others. You can specify a total face count for an object. But if NURBS aren't your style, the patch and spline tools have been updated too, with Digimation's popular Surface Tools making a full appearance.

There's more, in the field of character animation. You don't need *Character Studio* any more, since Discrete has finally incorporated a decent skinning and boning system. You can apply a deforming Skin modifier to a mesh, patch or NURBS object, and apply volumetric control envelopes and paintable weights for tight control. The new Flex Modifier for automatic secondary deformation, which essentially turns an object into a soft body.

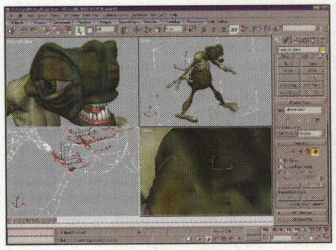
You'll have to discover the rest for yourself. This upgrade puts the package into a truly professional arena, and as such, the upgrade is essential.

Verdict

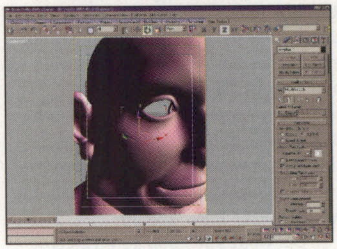
★★★★★

System requirements

PC Min: *P200 ▸ 64RAM ▸ Win 98/NT 4*



Create dazzling 3D creatures with *MAX*.



Objects get their own Transform gizmo.

Bryce 4

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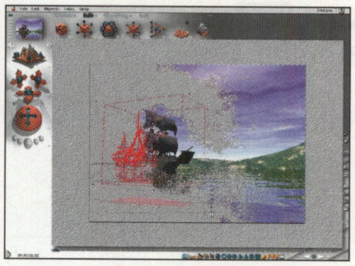
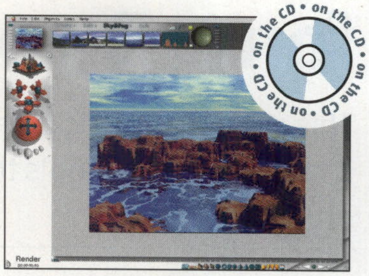


Bryce 4 **features the useful Spray Render.**



You can quickly create complex terrains.

Bryce is synonymous with dreamy land, sea and skyscapes. And no wonder, because the scope and the immediacy that Metacreations' 3D package offers the fantasy earth artist are truly brilliant. Few other 3D packages offer quite such breathtaking results quite so quickly.

That doesn't mean that it's a one-click wonder and no place for an artist to be rendering. Nor that you can't create anything else with it. *Bryce*'s possiblities are infinite, and midnight renderers have been known to get lost in there.

Version 4 sports much the same peculiar interface as previous editions – we've come to expect nothing less from Metacreations. But beneath the legion of drop-shadowed button widgets lie a number of powerful new features.

If you want to create a terrain, there's a Terrain Editor and a drop-down of fractal prefabs. Naturally you'll want to take things into your own hands, and a glut of tools alongside a rotating preview enables you to edit the greyscale image used to create the polygon mesh that becomes your landscape.

Then, to give your creation a surface of some kind, you have a Material Lab and the deep texture editor, where you can mix and match textures to produce the improbable and unimaginable. For the faint of heart, the edit menu stows a plethora of preset alternatives.

If you're in the landscape business, you'll want to create a sky or an atmosphere of some kind. *Bryce*'s Sky Lab is on hand for the job, offering a high degree of one-stop simplicity or infinite control – whichever you prefer. Again, you have a fully interactive preview, as you experiment with settings for sun, moon, stars, clouds, turbulence, and so on. And for the patient, there's a volumetric lighting function by the name of Volumetric World, which simulates the behaviour of light interacting with particles in the air.

And of course you'll want to render, and the quality of output you can achieve with this in *Bryce 4* is excellent. Meta has added in BryceTalk, so you can e-chat with other *Bryce*rs while your CPU does the business.

Version 4 also sees the inclusion of mesh export for *Lightwave*, *Ray Dream*, *AutoCAD* and other formats among others, and import for *Lightwave* and *MAX* meshes. Less great, however, are *Bryce 4*'s animation facilites, which are nothing to shout about. Perhaps version 5 will see a rehash? ca▸s

Verdict

★★★★☆

System requirements

PC Min: *Pentium ▸ Win 95/NT 4 ▸ 32RAM*

Mac Min: *PPC ▸ Mac OS 7.5.5 ▸ 32RAM*

Electric Image 3D 2.9

This great renderer has its own modelling tools – and the price is slashed to boot

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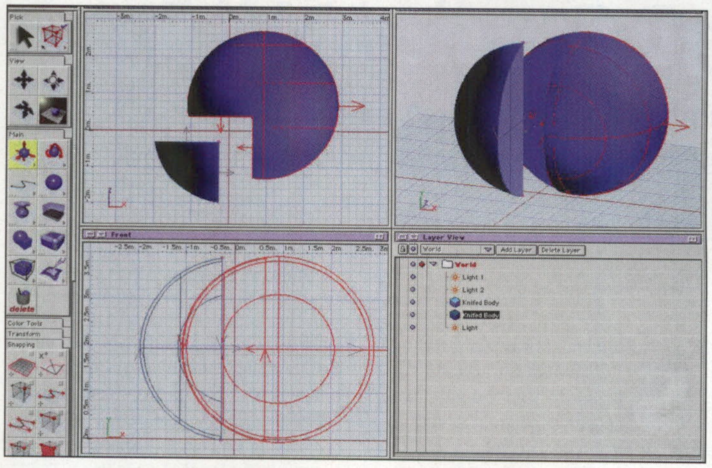

Electric Image **copes with rounding tasks that other modellers would baulk at.**

Electric Image has been widely used in broadcast and movies for hi-end visual effects rendering over the past five years. As a Mac-only specific rendering application, it previously held a price tag of £7000 – securing itself the elite status its rendering capabilities deserve, but obviously not making itself available to the growing number of 3D artists using other operating systems, and running more down-to-earth budgets. But that's all changed now, as *Electric Image 2.9* has come out on Mac, with a promise that it will be ported to NT and IRIX.

But what's so good about *Electric Image* to make people pay £7000 for its services? Essentially it's the incredible speed of the rendering engine – and version 2.9 is claims speed increases of up to 15 per cent. There's also an in-built Phong-shaded preview that gives you a very accurate peek at your final output.

The other major asset is *EI*'s ability to handle huge amounts of data – hence the appeal for those outputting for movie-quality graphics. It's this existing technology – and reputation – that lies behind the latest release. What's new in 2.9, aside from the increased rendering speed, is a well-specced set of modelling tools, aka *Electric Image Modeller 1.0*. These include solids/surface hybrid modelling and NURBS support (again EIM has its own variant, UberNURBS – a closed surface with a control cage, but this system can employ more than the standard four edges to the cage).

You'll also find Coons surfaces, multi-dimensional Booleans and an impressive set of Bezier curve modelling tools. The modelling tools are good enough to give many standalone specific modelling applications a run for their money, and the lightning quick rendering engine is second to none. Throw in the promised multi-platform releases and the huge price drop, and *Electric Image 2.9* is a package we rate highly. ca▸s

Verdict

★★★★☆

System requirements

Mac Min: *PPC ▸ Sys 7.1 ▸ 64 RAM*

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buyer's guide

The essential guide to the best 3D software available – tested for you

Over the past year *Computer Arts* has reviewed heaps of software. In addition to the reviews brought to you over the past few pages, here's a summary of the key 3D software we've tested recently...

3D software reviewed in Computer Arts

Name	Platform	Price	Company	Tel/Web	Stars	Iss
Under £300						
Blender *Idiosyncratic but incredibly affordable 3D package for design, animation and rendering. Metaball modelling is available. Some basic 3D paint functions are included, but the software is difficult to learn.*	PC	$100	NeoGeo	www.blender.nl	3.5	34
Shaderman *Another Lightwave plug-in essential for producing dry-looking matter surfaces. There's metal, plastic, plank, marble, rubber, clouds and more to choose from. You can even animate the shaders.*	PC/Mac	£106	PAR Services	020 7437 1486	4.5	32
Amorphium *This program's simple interface makes 3D shape sculpting a dream. Work from primitives, to quickly and experimentally achieve the shape you want. And it doesn't require expensive hardware to run.*	PC/Mac	$150	Play Inc	www.play.com	4	33
Tree Druid *Botanical plug-in for Lightwave. You can have complete control over the way a tree looks from the trunk, up to the branches and out to the leaves. You'll quickly find the urge to have forests in every scene.*	PC/Mac	£135	PAR Services	020 7437 1486	4	32
Vue d'Esprit 3 *Specialised landscape renderer that turns greyscales into relief terrains. It uses procedural materials and textures and also boasts fog, haze, cloud and sunlight features. This is one to watch.*	PC	£149	HiSOFT	01525 718 181	*	40
Poser 4 *Comprehensive model creation program that specialises in people and animals. Improved controls as well as hair and clothing feature. Some may find the interface tricky.*	PC/Mac	£235	Computers Unlimited	020 8358 5857	3	35
DarkTree Textures *Texture creation proving too time consuming? One answer is procedural texture generation – the mathematical creation of textures. It's a bit like making fractals, but far more controlled and useful.*	PC	£282	Digimotion	020 7287 3510	4	32
PiXELS:3D 3.2 Studio *Strange package with a spline-based surface modeller. It supports NURBS, B-splines, Catmul-Rom and Tau. It tesselates all surfaces before shading for resolution independent models. Good shading too.*	Mac	$299	Pixels	www.pixels3D.com	4	37
Under £700						
Ray Dream Studio 5.5 *A new interface and a new bubble modeller make this useful for creating organic, fluid forms. Four Elements expansion pack adds a terrain and landscape modeller. Good tutorial CD with 200 models.*	PC/Mac	£340	Computers Unlimited	020 8358 5857	3.5	37
Canoma *Rocket science in a box. Create 3D scenes from photographs, then save them and manipulate them. Realworld sampling for 3D has never been this easy. No curves – the only let down.*	PC/Mac	£399	Computers Unlimited	020 8358 5857	4	34
Digital Nature Tools *Series of plug-ins for creating water, atmospheric and cloud effects. Used for effects in Titanic, Waterworld and The Fifth Element it works with Softimage|3D, Maya, 3D Studio MAX and Lightwave.*	PC/Mac	£400	Digimotion	020 7287 3510	3.5	32
Particle Storm 2.1 *Rain, bees, hair – what sort of particle effect do you want for Lightwave? Then choose how they're ejected into your scene. Wind, turbulence, gravity, flocking, swarming and so on. Need we mention colour and transparency?*	PC/Mac	£423	PAR Services	020 7437 1486	3.5	31
RayMax 2.5 *A raytracing plug-in for 3D Studio MAX offering great levels of realism. You can specify reflectivity and specularity, and even calculate internal reflections and caustics. Soft shadows and depth of field also feature.*	PC	£470	Digimotion	020 7287 3510	4	32
ProOpticSuite *Three MAX plug-ins in one box. PyroCluster 1.6 sorts your smoke and steam; RealLensFlare predictably does lens flares; and LumaObject will convert MAX objects into light-emitting MAX objects.*	PC	£470	Digimotion	020 7287 3510	4	32
Art.lantis Renderer 3.5 *A rendering program featuring fast raytraced previews. The new version includes camera animation capabilities on top of the normal lighting and shading controls.*	PC/Mac	£494	Gomark	020 7371 7930	*	40

Name	Platform	Price	Company	Telephone	Stars	Iss
Creature Creator 1.51 *This is a plug-in with versions for Lightwave, 3D Studio MAX and Maya. Make creatures in a separate window by choosing body parts and building them a la Frankenstein's monster. A touch buggy.*	PC	£various	Graphics Domain	01494 515 500	3	36
Piranesi 2.0 *Named after a 16th Century artist, Piranesi is ideal for architectural designers. It enables you to texture and manipulate rough models to come up with astounding looking buildings, full of atmosphere. A nice, niche program.*	PC	£529	Informatix	01223 363 014	*	40
Cloth Reyes 2.2 *This does for 3D Studio MAX what Cloth does for Maya. Modify the clothing of your characters with settings for creasing, flowing and flexibility. Silk, rubber and even stone cloth is available. Kinky.*	PC	£558	Digimotion	020 7287 3510	4.5	34
MetaReyes 5 *With this metaball modelling plug-in you can bring your own organic forms into 3D Studio MAX. Build complex forms from a series of simple muscles. It's fast and convenient, especially for faces.*	PC	$695	REM Infografica	0034 91 319 4155	4	34
Lightscape R3.2 *Powered by a radiosity renderer, Lightscape is ideal for visualising buildings and architecture. A huge selection of realworld materials is included to boost realism. It's slow but powerful.*	PC	£646.25	Autodesk	01483 462 620	4	36
Under £12,000						
KineCapture *This 3D Studio MAX plug-in brings you the opportunity to use motion capture data in your animations, using video clips as your motion source. A good understanding of IK is essential.*	PC	£816	MCC	01332 812 938	3.5	31
VectorWorks *Essentially a CAD program supporting vector drawing in both 2D and 3D, the inclusion of the RenderWorks renderer turns it into a nice artists tool. Rendering is a bit slow.*	PC/Mac	£939	Gomark	020 7731 7930	3.5	31
Picza *This isn't strictly speaking software, but it's worth considering if you want to scan in small objects from the real world for use as 3D models. 3D scanners used to cost £20,000 or more. This one's yours for a grand.*	PC/Mac	£1169	Patrick Thorn & Co	01784 466 474	4	32
Character Studio 2.1 *The most widely used character animation plug-in for 3D Studio MAX. It boasts a hefty price but adds due functionality with Biped and Physique modules. Think Dancing Baby and you're there...*	PC	£1169	Discreet	01483 462 600	4.5	32
solidThinking 3.0 *Modelling and rendering par excellence, with high quality NURBS curves and a heap of tweakable features. You'll find a demo of version 3.5 on our CD. Try it out.*	PC	£1494	Gestel	www.gestel.com	4.5	33
form.z *Powerful yet complex 3D modelling program. Create intricate models using NURBS with its amazing new curve tools. Animation is limited to camera movement and the interface can seem cluttered.*	PC/Mac	£2100	Gomark	020 7731 7930	3.5	30
Mirai NT *Real-time polygon-based program for modelling, rendering and animation, plus 3D painting. It always works in closed solids so you don't have to worry about uneven edges. Streamlined interface.*	PC (NT)	£5869	Techex	01628 777 800	4.5	35
FAMOUS Faces *Facial animation remains a mysterious field. This application combines motion capture and key frame animation and keeps it simple while controlling the results. Trouble is, you need to get motion capture data in order to use it.*	PC	$6250	Beam International	00613 9866 8300	4	31
Houdini 3.0 *Up and coming high-end application that's about to be released in its fourth incarnation. Its unique way of working is powerful but the functionality quite arcane. The new version will challenge the likes of Maya.*	PC	£10,950	Pixelution	01462 433 558	n/a	n/a

*** as we go on sale these reviews have not appeared in print. To read the full review purchase issue 40 of Computer Arts, on sale from 22 December 1999.**

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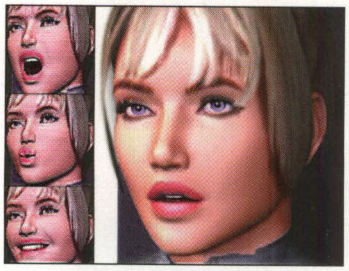
webguide

40 essential 3D sites, with software, tips and inspirational artwork

The 3D world is big. And getting bigger all the time. This is demonstrated by the number of Websites devoted to 3D. From vast repositories of free resources like textures and models, to small design houses, and sites devoted to individual software packages, the amount of on-line advice and inspiration on offer to 3D beginners and experts is awesome. We've rounded up 40 of the best sites for your on-line 3D pleasure. They're all worthy of a glance, and most will offer tangible benefits for dropping by. You can link to most of them directly from our CD – so tell them we sent you...

3D Resources

3D Artists
w www.raph.com/3dartists
This highly-polished site claims to be dedicated to 3D artists around the world, and it really delivers on its promise with an extremely stylish package. At its core is a gallery of 3D artwork submitted by over 140 artists from 30 countries. It's not just a one-way process, as you can tell the rest of the world (and the artist) what you think through the feedback form. There are interviews with many of the artists, plus tutorials for packages such as *SoftImage* and *3D Studio MAX*, and a jobs page.



Drop by the 3D Cafe to enjoy the ultimate resource for CG artists, with hundreds of images, models and textures.

Digital Blasphemy
w www.digitalblasphemy.com
Not sure about the name, but it's not one you'll forget in a hurry. The site's purpose is neatly utilitarian – based around over 300 free hi-res original 3D-rendered computer desktop wallpapers, animated start-up screens and screensavers, the site explains how they were made, with tutorials on how to create your own, and maybe submit them to Digital Blasphemy, along with links to other cool 3D galleries on the Web.

3D Cafe
w www.3dcafe.com
The 3D Cafe bills itself as the ultimate resource for computer graphic artists, and it certainly offers an impressive menu. There's a store promising bargain prices on 3D software packages, plus hundreds of free models, textures and tutorials to download. You can submit your own 3D models for your fellow artists to use, and scrutinise their creations in the gallery. There's also a mailing list, live chats and job ads as well. There's no doubt, the 3D Cafe is a must-visit.

Blackfeet
w www.blackfeet.com
Don't know why it's called Blackfeet, but once you've skipped the tasteful French welcome page for the English intro, you'll soon be more interested in the vast array of 3D plug-ins for *Lightwave*, *SoftImage*, *3D Studio MAX* and *Amapi*, plus meshes and maps. They're not free, but thanks to its French origins, you can think of this site as the 3D equivalent of a Calais hypermarket...

3D Site
w www.3dsite.com
It's a pretty useful site in its own right, but 3DSite lays claim to the largest dedicated 3D links database on the World Wide Web. It can boast a lively 3D community, with forums galore – a great place to look if you're searching for software or hardware bargains. There's also information on forthcoming events, and you can sign up for a regular 3D e-mail newsletter.

Avalon
w avalon1.viewpoint.com
This is a superb resource for hardened 3D fanatics. Billed as the original public 3D archive, its most impressive feature is a huge archive of downloadable meshes, everything from aircraft to vehicles, via dinosaurs, plus there's a myriad of textures up for grabs. You'll find loads of tutorials to download too – if you've ever wondered how to go about ice cube texturing, this site's for you.

3D Total
w www.3dtotal.com
3D Total is a British-based Website packed with free resources for 3D artists. There's a huge selection of meshes, plug-ins and textures to download, plus tutorials for *3D Studio MAX*, *Lightwave*, *Bryce*, *Poser*, *trueSpace*, *Maya* et al, and links and galleries. The site's British origins shine through – you can get your hands on a 3D model of a Dalek, for instance. All you need to model are the stairs it can't climb up...

Tips & Tutorials

3D Animation Workshop
w www.webreference.com/3d
Enter the Workshop to learn step by step how to create 3D graphics and animations, with a series of tutorials which is updated twice a week. When we visited, there was a workshop on 3D gaming for the Web, but there's a huge archive of previous tutorials if you want to catch up. The tone is visual and intuitive, with an emphasis on bringing 3D to life.

Digital Producer
w www.digitalproducer.com
Digital Producer offers a wealth of helpful 3D tutorials which will soon have you modelling futuristic starships and bouncing chess pieces. The site also points you in the right direction to find welcome free software and images. Be inspired by the excellent artwork and textures on display in the gallery – or submit your own. In addition, there's a range of features on how 3D techniques are being used in the latest Hollywood movies.

3D Render
w www.3drender.com
3D Render provides an impressive compilation of modelling resources – and it's hard not to be roused by the site's inspirational feel. There's loads of tutorials on topics like building characters, lighting in layers and NURBS modelling, plus career advice, book reviews and a gallery of work from 'visiting artists'. Plus there's a collection of the world's best organic NURBS models, all cleared for your own use.

3D Ark
w www.3dark.com
Climb aboard the 3D Ark for invaluable tips and articles on animation, lighting, modelling, textures, hardware and software recommendations, as well as plenty of career hints, like advice on how to produce a job-getting demo

reel. If you have a burning 3D question, check out the site's myriad of FAQs, or submit to one of the message boards, and you're sure to discover the answer. Tons of news and links are available, making this site a veritable fount of 3D knowledge.

Software

Canoma
w www.canoma.com

Ooh, ahh *Canoma*! You can't help but sing the praises of this package which allows you to quickly create realistic 3D models from photographs. This site features free downloadable demo versions, reviews, models and movies so new users can see exactly what it can do. For existing users there are tutorials, FAQs, links, as well as the first seeds of a gallery in which to exhibit your *Canoma* models.

Ray Dream Studio
w www.ruku.com/raydream.html

Stop by this site to grab a comprehensive collection of resources for users of *Ray Dream Studio*, the 3D design and animation package from Metacreations. It features loads of links and downloads, plus many inspirational tutorials which demonstrate exactly what you can do with *Ray Dream* and how to do it. They're all very easy to follow and you'll soon be itching to create your own dazzling images and animations.

Max 3D
w www.max3d.com

Devotees of *3D Studio MAX* should head directly to this impressive resource, dedicated to the modelling and animation package. It boasts over 100 free plug-ins, a shedload of tutorials, ranging from beginner's level to professional standard, lots of in-depth articles and interviews with *MAX* artists and programmers, as well as animations displaying just what *3D Studio MAX* can do – such as extracts from the forthcoming computer-generated TV series based on the movie *Starship Troopers*.

Kinetix
w www.ktx.com

The official Kinetix site provides you with *3D Studio MAX* resources galore. Centre stage goes to the impressive directory of plug-ins, but be sure to peruse the guide to learning more about *MAX*, with links to on-line tutorials and real world seminars and training materials. There are also hints on developing your own plug-ins, should you be so inclined, along with a gallery of *MAX* artwork.

Nightcraft's Lair
w http://users.visi.net/~nghtcrft

Once you've got past the rather convoluted opening sequence, this site reveals a collection of riches to delight all *3D Studio MAX* users. There's a bonanza of meshes, plug-ins and textures, as well as free tutorials to help you get the most from *MAX*. There's also loads of useful links and a gallery of artwork produced by the site owner as well.

Poser Forum On-line
w www.iguanasoft.com/poser/

If you've got a poser about *Poser* then drop by this site. It's home to a thriving community of users of the 3D human body modelling package, so you can post your queries, hints and gripes, and take advantage of other users' expertise. In addition, there's a highly inventive wardrobe of realistic clothing for your models – it's a bit like dressing up Action Man. Plus you'll find galleries, tutorials and contests.

Gomark
w www.gomark.com

It's well worth a peek, this site, if only for the comprehensive A-Z glossaries of modelling and rendering. If you've ever wondered what raydiosity meant, here's your answer. Brought to you by the people behind *Amapi*, *form•Z* and *Infini-D*, the site also features all the demos, updates, links and latest release information you'd expect, and more besides.

Caligari
w www.caligari.com

There's no finer space on the Web for *trueSpace* fanatics than this, the official site from Caligari. It's full to the brim with plug-ins, tutorials, news and reviews. It also features real life examples of *trueSpace*-created work, with endorsements from the creators. A nice touch. There's also loads of tutorials and support, including an e-mail discussion group where you can share your *trueSpace* tips and ask those burning questions.

Blender
w www.blender.nl

3D for the new millennium – that's *Blender*'s boast. Even better, it's free! It's an integrated suite for modelling, animation, rendering and post-production that only takes up 1.5MB. You can get to grips with modelling of polygon meshes, curves, NURBS, text and metaballs, plus animation with keyframes, motion curves. morphing and inverse kinematics. This site features all you need to get started, including a manual, tutorials and a link to a *Blender* chatroom.

Just one of many examples of the things you can create with *Poser*, as demonstrated at the Poser Forum On-line. You can also design clothes, although no-one seems to bother.

Phoenix Tools
w www.phoenixtools.com

Phoenix Tools is definitely a headline attraction for *SoftImage* devotees. There's no shortage of plug-ins and tutorials, although you do have to pay a membership fee to use most of them. There are freebies to be had if you hunt around, though, as well as a collection of movies and images created with *SoftImage*, which should give you food for thought.

POV-Ray
w www.povray.org

The *Persistence of Vision Raytracer* (*POV-Ray*, see?) is a high-quality tool for creating stunning three-dimensional graphics. And what's more, it's free to download from this site, which neatly features everything you need to get started, with FAQs, tips, links and a gallery of *POV-Ray* created art by way of inspiration. If you need any more encouragement, there's an ongoing competition to create the best artwork with the package.

Bryce Tips
w www.halcyon.com/alrives/brycetips/

Bryce 4 is the latest version of the design, rendering and animation package which enables you to create breathtaking natural 3D worlds and landscapes. If you're a *Bryce* user then you'll find this site invaluable – it features loads of techniques and tutorials for creating waterfalls, tornadoes, waves and much more, plus tips on advanced projects such as clouds and storms, mountains and forests, and underwater and space scenes. Wrapping it up are Q and As, messageboards, links and a *Bryce* gallery.

Flay.com
w www.flay.com

Without doubt this site should be the first port of call for all *Lightwave* users, boasting as it does a plug-in database featuring links to over 500 downloads, and over 200 tips and techniques. There's a myriad of links, including a comprehensive list of on-line galleries, as well as the very latest news from the world of 3D.

Lightwave World
w www.lightwaveworld.com

If your 3Ds are turning into 3Don'ts, this site promises to illuminate your metanurbs and pump up your polygons until you find your x/y axis rotating smoothly again. It features an impressive stash of resources for *Lightwavers* everywhere – textures, plug-ins, surfaces and objects, plus tutorials and a genre-based gallery featuring science fiction and architectural images among others, as well as a heavily-populated *Lightwave* discussion forum.

Maya Queen
w reality.sgi.com/tkluyskens_aw/txt/queenhome.html

Maya is probably the best 3D package named after a character from *Space 1999*. This site's aimed at the more advanced user of Alias|Wavefront's high-end software. Among the highlights is a glittering array of jewels

– downloadable example scenes to give you a head-start in tricky situations, or to give you working examples of complex effects. Plus there's hundreds of tips, scripts and tutorials, and a gallery which explains how the images were created.

Cinema 4D

w www.cinema4d.com

Now approaching its sixth incarnation, *Cinema 4D* is one of the premier modelling, animation and rendering packages around. HiSoft's official Website is crammed with reviews, tips and upgrades, and unmissable goodies like fully boned and textured Manga 3D figures, which you can bend and shape anyway you like. We've got the demo version of *Cinema 4D* on our coverdisc, so visit this site to make the most of it.

Studios

Pixar

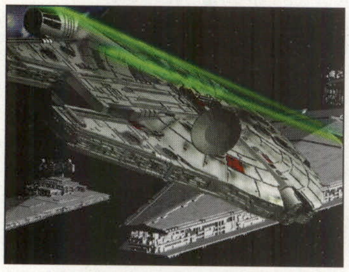
w www.pixar.com

It's just possible you may have heard of some of Pixar's movies. *Toy Story*, *A Bug's Life*... ringing any bells? When it comes to 3D computer animation, Pixar is leading the parade, and you can learn how it was all done at this Website, with a detailed breakdown of the animation process. Pixar also produces 3D packages such as *Renderman*, and this site tells you everything you need to know. To infinity... and beyond!

Little Fluffy Clouds

w www.littlefluffyclouds.com

Little Fluffy Clouds – named after The Orb song – is an award-winning San Francisco-based studio specialising in 3D digital animation and special effects, with a pretty impressive CV. On this site you can take a look at some of their creations to date, including commercials for Coca-Cola and Budweiser, animations featuring Disney's Winnie The Pooh, and the PlayStation game *Tekken III*. You can read how the studio, co-founded by British producer Betsy de Fries, goes about creating its output.



Use the force and construct your own Millennium Falcon in 3D, with the Star Wars Modeling Alliance.

Arcana

w www.arcanadigital.com

This is the on-line home of Arcana, a British studio specialising in 3D modelling, animation and graphics among other things. You can take a closer look at some of the many projects they've worked on over the years at this site, including games such as *Populous: The Beginning*, *Croc 2* and *RollerCoaster Tycoon*, and commercial work for Diet Coke and Lurpak Butter (you know, that little man made out of, erm, butter). This Shockwaved site's a joy to peruse.

Brainchild Studios

w www.brainchildstudios.com

Brainchild Studios is a Canadian-based computer animation company, which boasts that all its characters are blessed with real personality, thoughts and feelings, as well as rich backdrops, lighting and textures. Apparently during the design process their artists actually 'become' the characters they're working on. Hmm. Anyway, be sure to check out this site and download some of their inspirational 3D animations.

Me Company

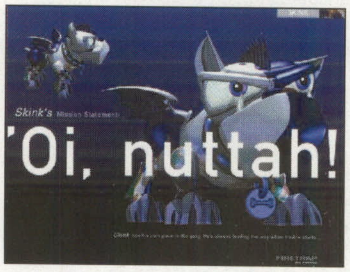
w www.mecompany.com

Me Company is a radical London-based design company – you may have seen its work on the cover of our last 3D special. Its client list is impressive – Apple, Nike and Bjork – and its Website's pretty cool too. Alongside the usual company info you can discover the studio's brilliant 3D creations, produced for companies such as Firetrap, as well as some essential eye candy for your desktop.

Viewpoint Digital

w www.viewpoint.com

Viewpoint Digital claims to be the worldwide leader in 3D model creation and publishing, with movies like *Star Trek: Insurrection*, *Armageddon*, and *Antz*; commercials for Nike and Toyota; and games such as *Civilization: Call to Power* to its name. You can get your hands on over 5000 3D models, textures and plug-ins, and if you become a member you get a 20-80 per cent discount.



Just one of the many dazzling examples of 3D design you can enjoy at Me Company's Website.

Angel Studios

w www.angel.com

With hit games like *Midtown Madness* under its belt, Angel Studios is at the forefront of 3D real-time interactive entertainment. The company combines 3D graphics with physics simulations, special effects and artificial intelligence, and also creates its own development software to boot. If you fancy yourself as a 3D games designer, it's worth paying this site a visit and discovering how the studio developed the virtual aquarium, Aquatica.

Pixels 3D Studios

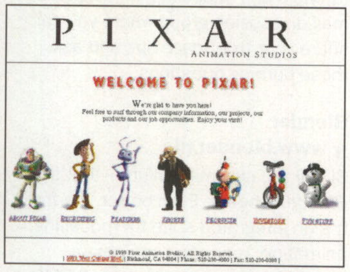
w www.pixels3d.com

Founded in 1991 as an animation studio, Pixels now develops artist-friendly 3D software – like raytrace rendering package Pixels 3D, a 30-day demo of which you can download from this site. The company has an impeccable pedigree, boasting close links with Industrial Light and Magic and Disney. Don't miss the great artwork created with *Pixel3D* on display in the gallery – especially the superb cartoon characters.

INsOMNIOUS

w www.insomnious.com/3d

INsOMNIOUS is a London-based new media and design consultancy studio, and their Website is a sumptuous 3D treat for the eyes. You can browse its impressive client list and check out the dazzling sites that the studio has created for such names as Disney, Electronic Arts and Virgin Interactive. The company's own site is pretty impressive, so worth a glance if you're looking at creating 3D for the Net.



PIXAR
ANIMATION STUDIOS

WELCOME TO PIXAR!

We're glad to have you here!
Feel free to surf through our company information, our projects, our products and our job opportunities. Enjoy your visit!

© 1999 Pixar Animation Studios, All Rights Reserved.

Buzz Lightyear and Woody welcome you to the on-line home of Pixar Studios, the folks behind *Toy Story* and *A Bug's Life*.

Miscellaneous

Star Wars Modeling Alliance

w www.swma.net

A long time ago, in a galaxy not particularly far away, a bunch of 3D modellers decided it would be cool to recreate the *Star Wars* universe in 3D at home. Here's the result, a must-see site featuring hints and advice on constructing your own Millennium Falcon, exploding TIE Fighters, lightsaber effects, and planetary effects, as well as all the meshes you'll need. In addition there's an impressive gallery featuring hundreds of breathtaking *Star Wars* models. The force is strong in this one.

3D Forest

w www.3dforest.com

If you can't see the wood for the trees – or if you just can't see the trees at all, why not get lost in the 3D Forest site. It features a massive selection of trees to enhance your 3D landscapes – woody trees, conifers, pines, aged trees, and even palm trees for that authentic Robinson Crusoe vibe. There's also the enticingly-named tree of the week to enjoy, as well as loads of useful rendering tips that'll make you the 3D equivalent of Alan Titchmarsh. Sort of.

Image Of The Week

w www.jsspace.com/3dp/contest

So you think you're something of a 3D hotshot, then? Why not put your skills to the test, then, by doing battle in this on-line war of the 3D artists? Even if you don't feel up to the challenge, it's still worth a peek, as you can vote for your favourite images every week, and get some inspiration for your own artwork at the same time. There's a gallery of recent winners and even a league table ranking the all-time champions, so join the fray now.

Bella Zi' – A Way Of Coolness

w http://bellazi.tds.nu

The cod-Zen philosophy stuff might grate just a little, but there's no doubting that this is a sound idea. The aim is to create an on-line showcase for all kinds of artists and creative folk. Hunt around and you'll discover some impressive 3D artwork, including some stunning 3D wallpaper for your desktop. British participants seem a little thin on the ground, however, so why not show the planet what you can do. We are on the Way of Coolness. Are you? ca•s

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Pictures courtesy of: **(clockwise)** Andrew Moffitt, Brian Gates, Ferry Whayudi, Frank Rivera, Geoff Holman, John Morrow, Mark Filteau, Scott Garrison, Anthony Patti

3D skills: trueSpace 3/SE

GETTING INTO 3D CAN BE DIFFICULT AND EXPENSIVE. HERE'S A TUTORIAL THAT WILL GET YOU MODELLING ON THE CHEAP...

Modelling and animation programs generally have two things in common – they are tough to use and expensive to buy. Wouldn't it be wonderful if they were free and easy to master, like *trueSpace 3/SE*?

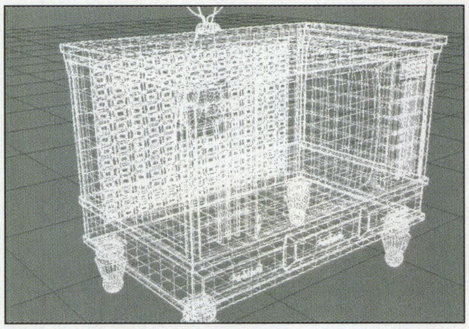
This powerful modelling, rendering and animation tool is FREE on this month's CD. It's a fully functional version, with just a few minor omissions from the complete *trueSpace 3*. It has a range of modelling tools including primitive objects, sweep, lathe and bevel. Models can be fully animated and even have IK (inverse kinetics) joints. This might sound complicated, but *trueSpace* is from the land of pointy-clicky and even animation is created in real-time.

If you're new to 3D on the PC then this is your chance to create some stylish CGI without breaking the bank. Try it and you'll be making your own *Walking with Dinosaurs* before the next ice age...

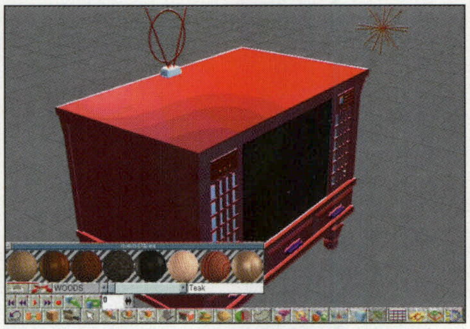
> "This might sound complicated, but trueSpace is from the land of pointy-clicky, so give it a try and you'll be making your own Walking with Dinosaurs before the next ice age..."

Stage One: Classic television

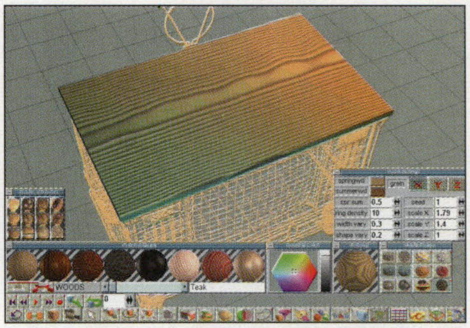
We're going to build a vintage TV set, using the free models and textures on our CD



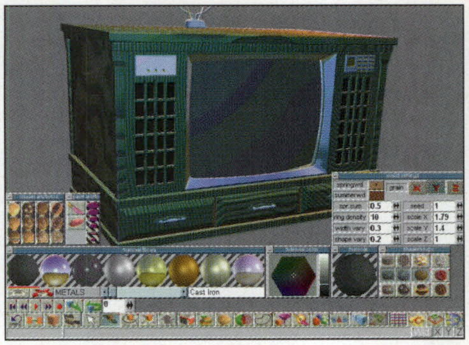
1 The TV is a DXF model from Viewpoint included on the CD. Open the Load Object dialogue and find vp22317.dxf on the disc. The size setting should be fit to screen. The weird normals make it look inside out – don't worry, it isn't.



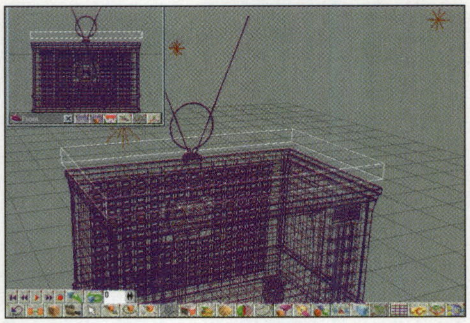
2 Nasty colours – but a nice TV. Let's do something about that finish. Open the textures panel and load the textures called WOODS. Choose teak and scale it to fit using the wood settings panel. To do this, right-click on the wood in shadermaps.



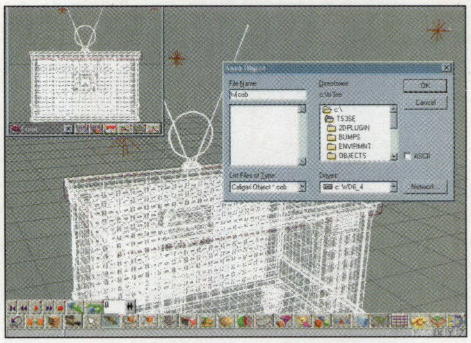
3 The wood texture can be set orientated in X, Y or Z. Try using different directions on each cabinet part to reflect the way the grain might run on those surfaces. To get to access to sub parts you will need to use the hierarchy controls.



4 The TV is nearly finished with the METALS texture coming into play for the controls and other metalwork. We used a combination of silver, chrome and copper to give a real 50s look.



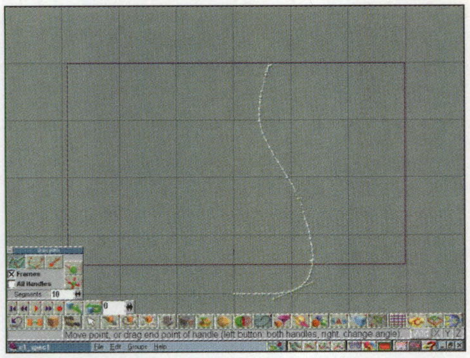
5 Now make a cube, and using the scaling controls, make it the same size as the TV top. Once sized it can be moved into place so that it fits reasonably. Now save the TV as a *trueSpace* object by highlighting it and selecting save object.



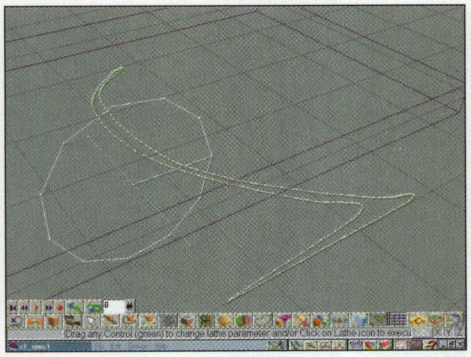
6 Delete the TV – we'll bring it back in later. The cube is our reference for the top in the meanwhile. The idea of the cube is to speed up working while we make extra parts to go on the TV.

Stage Two: Making a vase

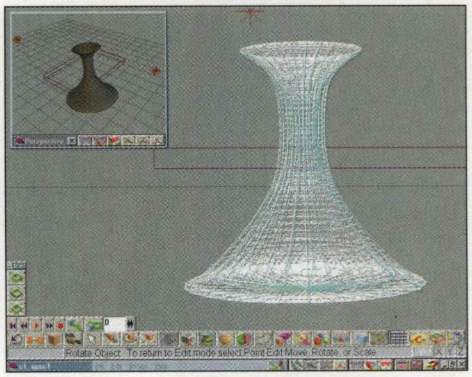
Now we'll create a vase to go on our television



1 The first object for the TV is a vase. For this we need to draw the outline of what a vase looks like if cut in half. Using the spline tool, create a closed curve. It must be closed as this is an open-ended object and needs an inside.



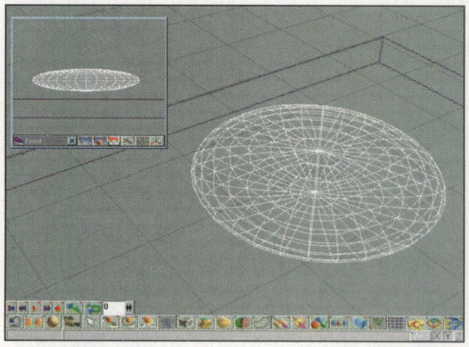
2 You can tweak the spline using the point editor before letting the lathe tool loose. The lathe has many possibilities, including part rotations and exact numbers of sides. If you want something more geometric try reducing the number of sides to four or five.



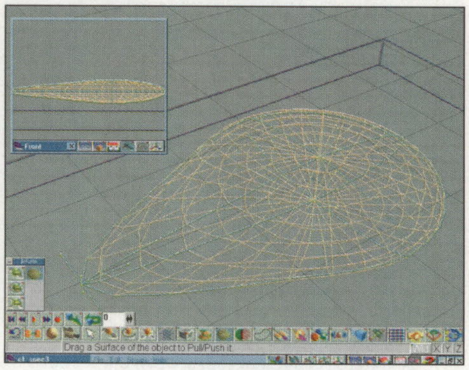
3 Once the vase is lathed it will need to be re-orientated and scaled for positioning on the TV top. The rotation is best done with GRID active, otherwise you will never get it straight.

Stage Three: Remote control

Did they have zappers back in the 50s? No flipping...

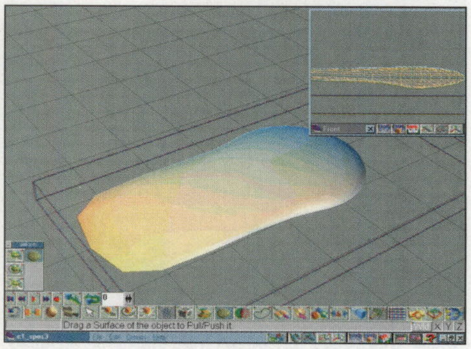


1 The TV remote starts life as a sphere. This is reduced to about a fifth of its height using the scaling function. Use the Z object lock to stop accidental scaling in other directions.



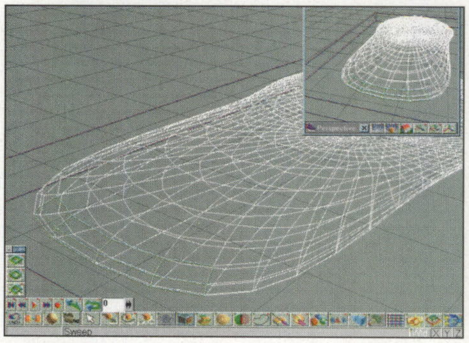
Drag a Surface of the object to Pull/Push it

2 The Deform Object tool is used to start pulling the shape around. The idea here is to produce a teardrop shape with a nice rounded back end.



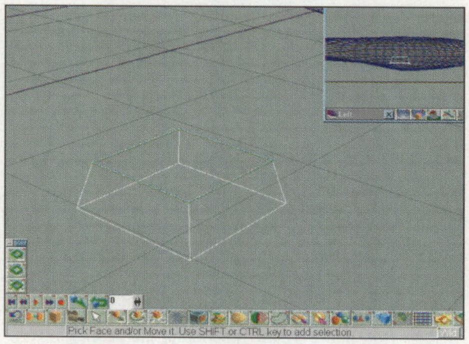
Drag a Surface of the object to Pull/Push it

3 The basic form is now complete. Note how the underside has also been sculpted using the deform controls. It needs a further operation to make it less angular. Use smooth quad divide.



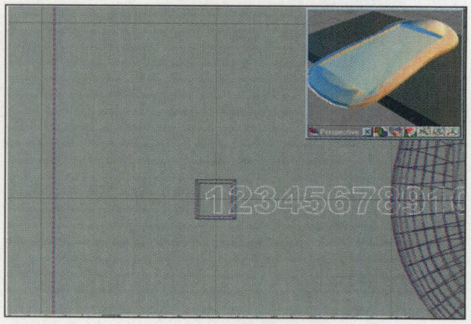
Sweep

4 All remotes have a small infrared part at the front. To do this we highlight a line of polygons and then extrude them back into the shape. This makes a clean recess.



Pick Face and/or Move it. Use SHIFT or CTRL key to add selection

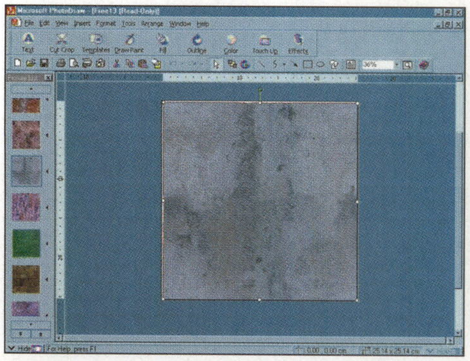
5 Buttons are simply cubes. To give them a bevelled look, the top face is selected, using polygon edit, and then scaled in X and Y. After scaling, the object is squashed slightly in the Z direction.



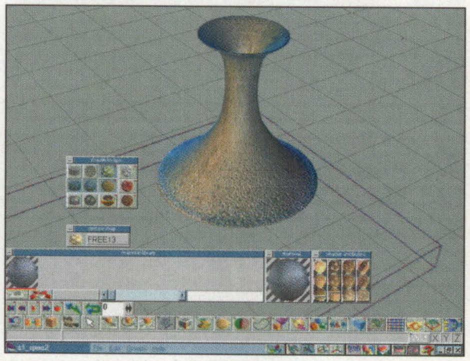
6 Our keys need numbers on. Type all the numbers in at once using horizontal text. Then scale to fit your button, sweep some depth and then break apart for individual use. This looks better than using textures.

Stage Two: continued

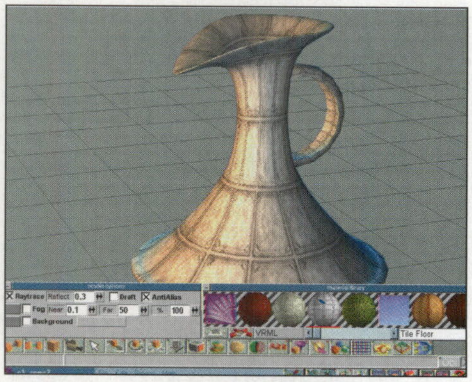
Our vase is nearing completion



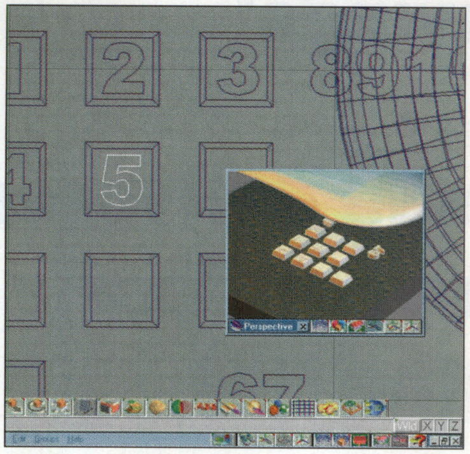
4 Back to the free textures on our CD – this one has the snappy title of FREE13. Before we can use it, we need to convert it from TIF to BMP. Here we are using *Photodraw*, but most bitmap editors will do this.



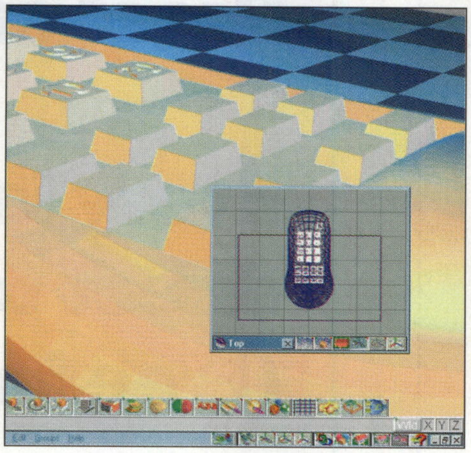
5 Once converted to BMP the FREE13 file can be used as a *trueSpace* texture. Open the material library, make a new library and define a texture base using the shadermap panel. To add surface effect, the environment map for IRON1 was also used.



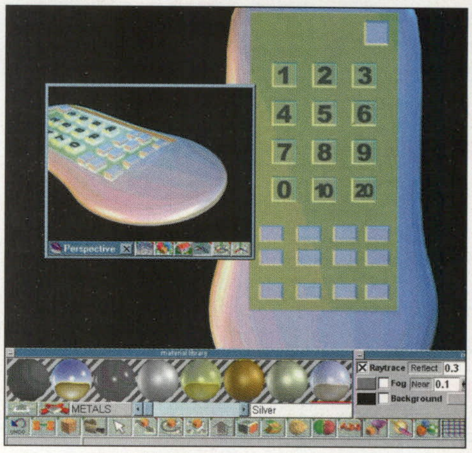
6 Even with simple objects you can make mistakes. This vase turned into a pitcher and was rejected. The spout was made with deform and the handle from a hacked-about torus.



7 To prepare the location, the remote form has had a rectangular block removed from the top using a Boolean subtract operation. Now the tedious part. Copy the button and assemble with the numbers.



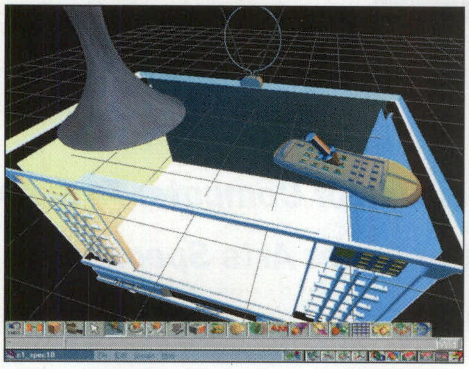
8 Using glue as sibling, weld all the parts together they can be placed on the remote. Start by moving them all to the correct Z position, before locking Z and moving them only in X and Y.



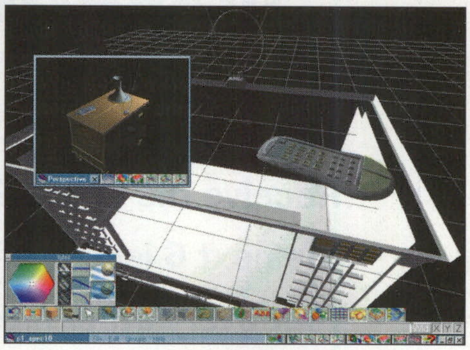
9 Texturing the remote. To match the TV controls, the design is decked out in copper and silver. The brushed metal look adds to the overall effect. We're ready for final assembly and rendering.

Stage Four: Scene creation, lighting and rendering

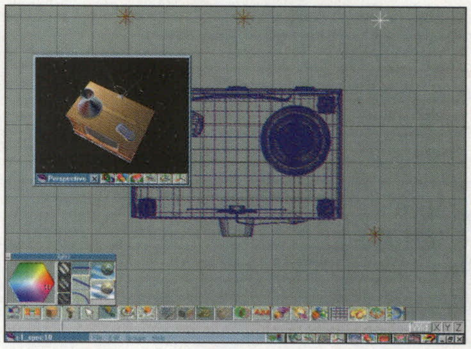
Let's put it all together to create the finished image



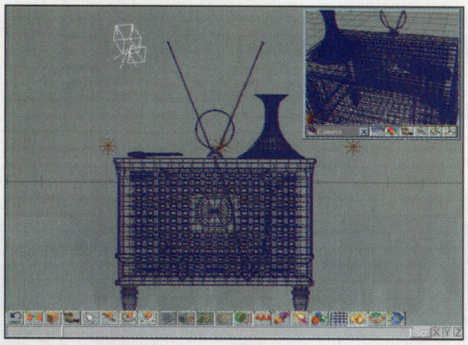
1 All the objects have been brought into the scene and positioned. The background has been set to black and the viewing mode to D3D.



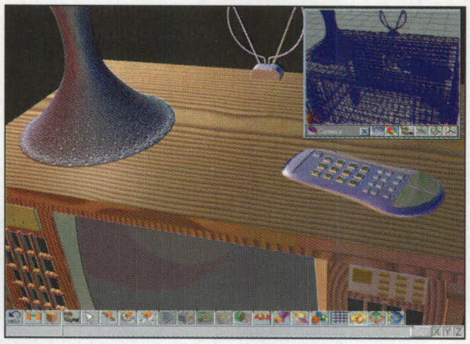
2 The three default lights need deleting and four new ones creating. One above and behind and three in a line ahead of the TV. The three are set to red, yellow and blue for highlights and the other to white.



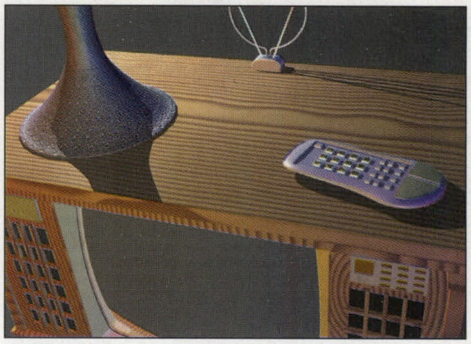
3 The lighting plan is to have one light that casts shadows and three others that contribute colour and depth to the scene. Then balance the lights with 80 per cent coming from the shadow casting light.



4 Using either D3D or OpenGL viewing mode helps position the shadow light as the effect is interactive. Use a second display window to do full renders to check the end result.



5 Add a camera and set the second viewing panel to be that camera. With both views set to wireframe mode move the camera until you're happy with the position.



6 The finished image. This took just two minutes on a PII 300 to produce at a resolution of 800x600. You might want to try animating this scene or adding more objects.

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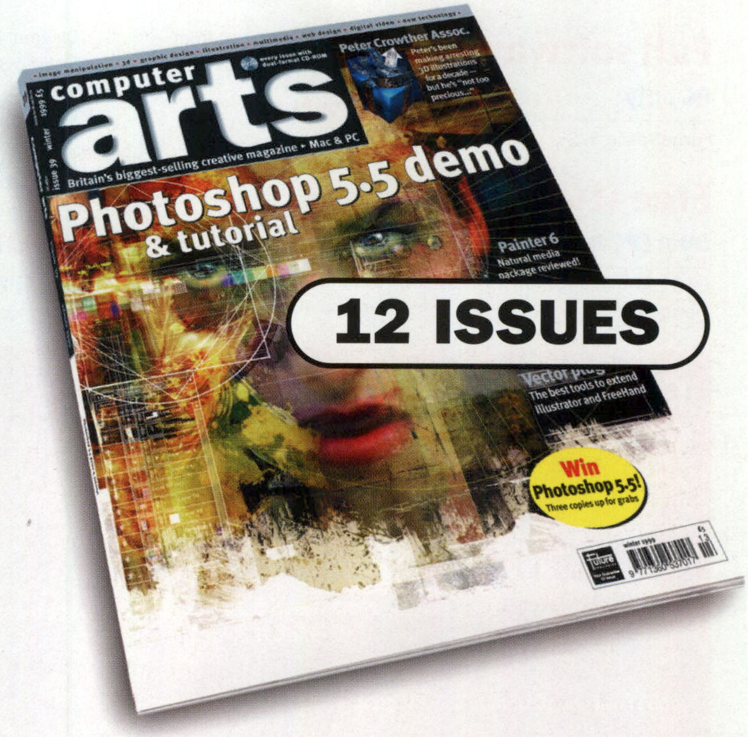
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CD Index

Full software

PC only

- trueSpace 3/SE

Free stuff

Dual (PC & Mac)

- 10 DXF meshes from Viewpoint Digital
- 15 tileable textures from Picture Garden

Demos

Dual (PC & Mac)

- Amapi 3D 5
- Bryce 4
- Canoma
- Cinema 4D Go
- Cinema 4D SE
- Cinema 4D XL 5
- form•Z 3

PC only

- solidThinking 3.5
- trueSpace 4.2

Resources

Dual (PC & Mac)

- Adobe Acrobat Reader
- QuickTime 3
- Plus the files to accompany:
  - the Alien Insect tutorial (page 18)
  - Visualize architectural render tutorial (page 54)

PC only

- Netscape Online – free ISP

Showreels

Dual (PC & Mac)

- Shark Attack by Magic Pictures
- Bingo a Maya showreel
- RealTime architectural visualisation

CD-ROM Basics: read this first!

Our 3D Special disc is easy to use, but read this section just in case you have difficulties

1 How do I start the CD?
Pop the 3D Special CD into your drive and it should autorun with either Windows or Mac. If not, run either:
- CAS6 if you're on a Mac, or...
- CAS6Win if you're on a PC using Windows 95, 98 or NT. To toggle the auto-run on and off, use the appropriate Control Panel on your computer.

2 Do I need any 3D skills to use this disc?
Not necessarily. For PC users we have included a special version of *trueSpace 3* on the CD and a full three-page tutorial showing you how to get started with this software starting on page 88 of the magazine. Mac users can try their hand with any of the dual demos on the disc. Why not try following our shark modelling tutorial on page 25 using the *Amapi 3D 5* demo, or the *form•Z 3* demo.

3 Is there any Windows 3.1 software on the CD?
We no longer support Windows 3.1 on the PC, nor the 68K systems on the Mac. This is because these platforms are no longer powerful enough to support the high demands of 3D software these days. The Computer Arts Special CD interface will run on a Macintosh PowerPC or G3, or a PC with Windows 95 or higher. Some demos may require Windows 98 or NT to run properly.

4 Do I need any specific software to run the CD?
You will need Apple's *QuickTime 3* software as it assists the running of our CD interface. It's supplied on the CD and you'll be prompted to install it if you haven't got it.

If you're using a Mac, then the CD interface will work fine with any version of QuickTime installed. However, if you're using Windows and have QuickTime 3.x installed, the interface may claim that QuickTime is not installed on your computer. If this happens, please install version 2.1.2 of *QuickTime*. You'll find it in Resources on the CD, alongside *QuickTime 3.x*. This will not erase your installation of *Quicktime 3.x* and should solve your problems.

You will also need a Web browser and an active Web connection in order to make use of the Web links on our disc. PC users are welcome to try the Netscape Online free ISP connection software on our CD. Whatever the case, please ensure you're using one of the following browsers to make use of this feature of our CD:
- Microsoft *Internet Explorer 3* or higher
- Netscape *Navigator 3* or higher

Please also ensure you're connected to an ISP before starting the CD if you intend to use the Web-linked features we've included.

5 What if I need further assistance with the CD?
Please be sure to read the entry relating to the software you're trying to use before contacting us. If you do have a problem getting a program to run, contact our technical support department via the following means. E-mail is the best way to contact them.
- **e** cas.support@futurenet.co.uk
- **w** www.futurenet.co.uk/support
- **f** 01225 732 279
- **t** 01225 442 244 (ext 2101)

At www.futurenet.co.uk/support you'll find a list of frequently asked questions and solutions to common running problems reported for our disc. This Website is kept up to date and has links for downloading any material that might solve a potential problem. Please e-mail our support team at the dedicated Computer Arts Specials e-mail address quoted before trying to telephone. The lines can be very busy at times. We regret that due to the complexity of 3D software we are unable to offer full support beyond installation queries.

From our straight-forward interface you can find all the key benefits on our CD.

6 What if I have a faulty CD?
This is highly unusual, but if it's confirmed by our technical support team please return your faulty disc to the following address and a free replacement will be with you inside of 28 days: Returns Dept, TIB plc, Unit 5, Triangle Business Park, Pentrebach, Merthyr Tydfil, Mid Glamorgan, CF48 4YB.

Software Demos

Dual (PC & Mac)

Amapi 3D 5

Full product: £299
Computers Unlimited
***t* 020 8200 8282**
***w* www.tgs.com**

Amapi may not carry a fat pricetag, but it's still a tool of choice for many modelling experts, particularly on the Mac. This brand new version has more dynamic modelling features, enabling you to change the shape of objects directly, and even manipulate facial expressions. There are new tools for filleting, smoothing objects and decimation, which reduces the number of polygons in a mesh so you can work quicker. Perhaps the jewel in the crown is the new ZAP export feature which enables you to export your NURBS models for use on the Web. Give this limited demo version a try.

Bryce 4

Full product: £210
Computers Unlimited
***t* 020 8200 8282**
***w* www.metacreations.com/uk**

Bryce began life as a novelty landscape texture generator which could create simply awesome looking terrains. Metacreations has ramped it right up, however, making it an extremely popular 3D package across the board. You can import DXF and OBJ meshes onto your scenes to create far more creative compositions. Version 4 still excels at landscapes. *Photoshop* plug-ins can be used to add new render effects and all kinds of tweaks can be performed to give your landscape realistic atmosphere and water.

Canoma

Full product: £399
Computers Unlimited
***t* 020 8200 8282**
***w* www.metacreations.com/uk**

Canoma's a funny fish. It costs less than £400, and yet it enables you to do things that once required a £20,000 3D scanning set-up. Simply scan in photos of a building or setting you want to turn into a 3D scene and, with the addition of your 3D skills, *Canoma* will do the trick. We've even heard of office complexes being turned into *Quake* levels using the software. You can feel your way around the program using this demo, however you won't be able to use your own scenes unless you buy the full version.

Cinema 4D Go

Full product: £169
HiSoft
***t* 01525 718 181**
***w* www.cinema4d.com**

Cinema 4D Go is a tidy little package which, as the name suggests, will get you started in 3D without too much fuss or bother. You can model, render and animate 3D scenes, and, if you're a little more ambitious than most of us, you can even export your animations at broadcast quality resolutions. We've included a demo here for you to experiment with. If you buy the full version you also get the *Instant Space* package, which streamlines the process of building spaceships.

Cinema 4D SE

Full product: £529
HiSoft
***t* 01525 718 181**
***w* www.cinema4d.com**

Cinema 4D SE is a step up from GO, a fact reflected in its pricetag. Though it omits some of the high-end modelling tools found in the XL version of the program, it's mighty handy for designing scenes. It boasts plenty of built-in effects which can prove handy for creating animated logos and idents. A powerful and fast ray tracing engine rounds off the rendering end of the bundle, and you can export your files at sizes of up to 16,000x16,000 pixels. Which is enough for anyone.

Cinema 4D XL 5

Full product: (v6) £1469
HiSoft
***t* 01525 718 181**
***w* www.cinema4d.com**

We've included this *Cinema 4D XL 5* demo for you to get a flavour of the types of things on offer at the top of the HiSoft range. *XL*'s a pro tool boasting NURBS modelling and bone-based animation systems. Animations can be given life with an array of particle effects and again broadcast rendering quality is available. The demo we've included is for version 5 of the program, however by the time you read this version 6 should be available. Watch for the demo of version 6 with an upcoming issue of *Computer Arts*, and see our preview of the program on page 74.

form•Z 3

Full product: £2110
Gomark
***t* 020 7731 7930**
***w* www.gomark.com**

This respected program specialises in modelling – both kinds. (That's solid and surface to you and me.) You can design directly on screen or use numeric inputs to control your forms. It's great with Boolean procedures, and with NURBS and Coons patches covered you're ensured smooth, organic surfaces on your objects. Unlimited undos make it easier to track down your mistakes and tweak your creations. Camera animation is now included, and you can export your animations to QuickTime and AVI formats.

⇨

trueSpace 3/SE Full 3D application (PC only)

Caligari Corporation
***t* 01752 895 100**
***w* www.caligari.com**

Whether you're a 3D novice or an experienced rendering and animation pro we have no doubt you'll find this free full version of *trueSpace 3/SE* to be an interesting treat on our CD. *trueSpace* has an illustrious history on the 3D graphics scene. The program was one of the first to introduce an icon-driven interface and direct manipulation. Sifting through menus is a thing of the past with *trueSpace*. Though the interface may seem a little strange at first, once you get used to it you'll become an expert at rotating, scaling and extruding your PC models. To cap it off, *trueSpace* is a lot cheaper than many other 3D packages on the market.

trueSpace 3/SE has the crucial modelling tools you'll use. You can whack in primitive shapes, and you can lathe, bevel, deform, glue, subtract and intersect shapes. But there's more to it than that. The program contains some strong rendering and animation features as well. You can paint your objects, or choose surfaces from the Material Library included.

On the animation side you'll find some fairly advanced features including fixed, sliding and hinged joint options, as well as a spherical joint. Furthermore you can edit joints directly.

We could go on and on, but if you really want to learn the ins and outs of *trueSpace 3/SE*, your best bet is to follow our tutorial starting on page 88 of this 3D Special. This tutorial is aimed at beginners, but will be followed by a more advanced tutorial in issue 41 of *Computer Arts*, on sale from 25 January 2000.

PC Min: *486 (Pentium recommended)*
▸ Win95/98/NT ▸ 16MB RAM ▸ 15HD ▸ VGA Graphics
▸ 3D card recommended

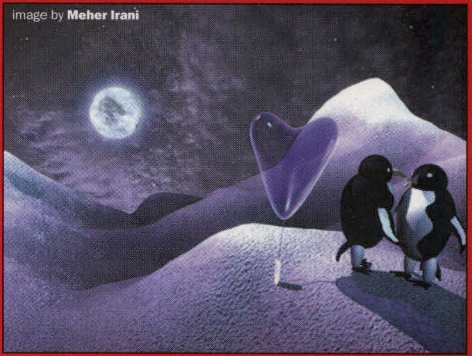


image by **Meher Irani**

Get to grips with *trueSpace 3/SE* and you'll be creating images like this in no time.

PC only

solidThinking 3.5

Full product: £1495
Gestel
w www.gestel.com

With *solidThinking* you get excellent NURBS modelling and rendering. The program has a nice colourful interface which you can just about work out without referring to a manual. Master the interface and modelling any object can become a joy. Key rendering options include ray tracing and radiosity. This demo works best with Windows NT, and doesn't allow you to perform renders.

trueSpace 4.2

Full product: £474.11
(or £295 on page 97)
Caligari Corporation
t 01752 895 100
w www.caligari.com

This application is particularly popular in the United States and is taking hold over here as well. The interface takes a while to get used to, but take the time and you can reap the rewards, particularly with version 4 of the program. It has a powerful and impressive radiosity rendering engine which will give your lighting a nice, realistic glow. You'll see features like NURBS support in modelling, metaballs and plastiforming and a 3D paint tool. This demo is limited to 30 days so make the most of it!

Dual Showreels

Shark Attack by Magic Pictures

Find out what's possible with *Maya*, an SGI and a little artistic application. This fantastic showreel is by the brand new 3D animation house Magic Pictures. You can read more about the company starting on page 22 of the magazine. The artists at Magic Pictures will even show you how to model the amazing shark you see here.

Bingo – a Maya showreel

Here's another showreel created using *Maya*, and it's simply stunning – not only because of the amazing effects you'll notice when you watch it, but because the dialogue is absolutely bonkers. Unfortunately, this video is compressed for QuickTime 4 so in order to watch the animation you'll need to download that new version of QuickTime from the Web. We apologise for the inconvenience, but it's well worth it, believe us.

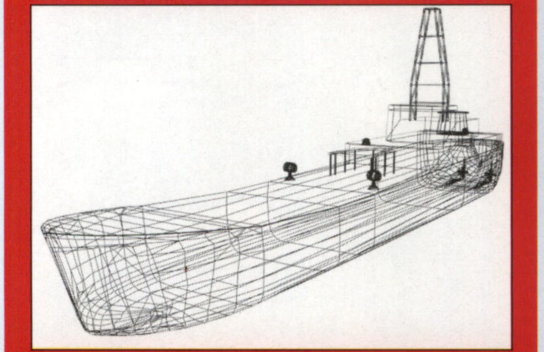
RealTime – architectural visualisation

Busty game heroines, freakish monsters and awesome effects are all well and good, but they're not the only way to make dosh in the 3D industry. This clip accompanies our feature on architectural rendering which starts on page 52. You'll see why companies like RealTime can impress clients in the big money property market. ca-s

Free Viewpoint Meshes

As sold for: £2500
Viewpoint Digital
t 01753 650 104
w www.viewpoint.com

Tired of spending hours modelling common objects like cars, aeroplanes or praying mantises? There is an alternative. You could just buy in the model you need from a 3D mesh library like Viewpoint Digital. The company sells meshes to major players throughout the CG industry from motion picture effects houses to game developers. We've teamed up with Viewpoint to bring you ten promotional meshes on our CD, which you're free to use in your own projects. For a pictographic listing of what's available, see page 29. These models are all in standard DXF file format, so you'll be able to use them in just about any self-respecting 3D application. They're in the Dual folder on our CD.

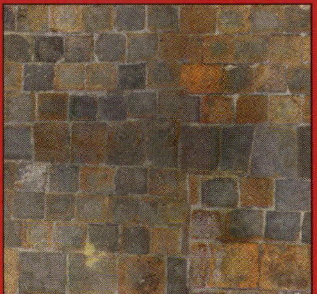


Just one of the ten (TEN!) free textures from Viewpoint to be found on our coverdisc.

Picture Garden Textures

Full product: Base at £55
Picture Garden
t 01423 529 992
w www.picture-garden.com

To *Photoshop* experts, painting textures can be a doddle. The program offers all sorts of filters to help give your objects luscious, touchy-feely exteriors. Alternatively, you could go out into the real world (scary!) and photograph bricks, blocks, rusty cars and trees in order to add an element of vital realism to your 3D scenes. That's exactly what texture experts Picture Garden do and the company offers a massive collection of everything from slate floors to fluffy animal skins. To save you a little time – and to give you a taster of the textures available from firms like Picture Garden – we've brought you 15 free textures on our CD. You'll find them in the Dual folder on the CD, and you're free to use them in your projects. They're saved as TIF files so you should be able to import them easily into your application. If you want to learn how to make your own tileable textures like a pro, see our tutorial on page 61.



Here's one of the 15 tileable textures on our CD. They're great if you want to texture up a setting with a unique look.

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Users love it; the press loves it. You can love it too – for an amazing low price available only to readers of *Computer Arts Special*. *trueSpace 4* has all the new features introduced in *trueSpace 3*, plus new high-end features like Bones, NURBS, Function Curves and Scripting. A brand new hybrid radiosity renderer allows you to create the ultimate in realism. The renderer alone is as much as the full version of *trueSpace 4*, and we are offering it to you for a low upgrade price!

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"trueSpace4 costs far less than Hollywood-style 3D software but still has amazing powers. Once mastered, trueSpace4 is an invaluable resource for the designer and the animator"

The Washington Post, July 1999

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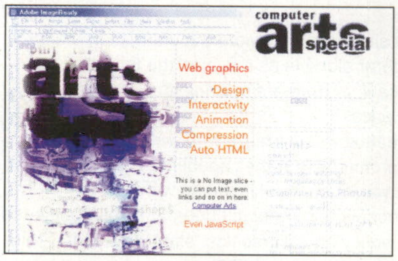

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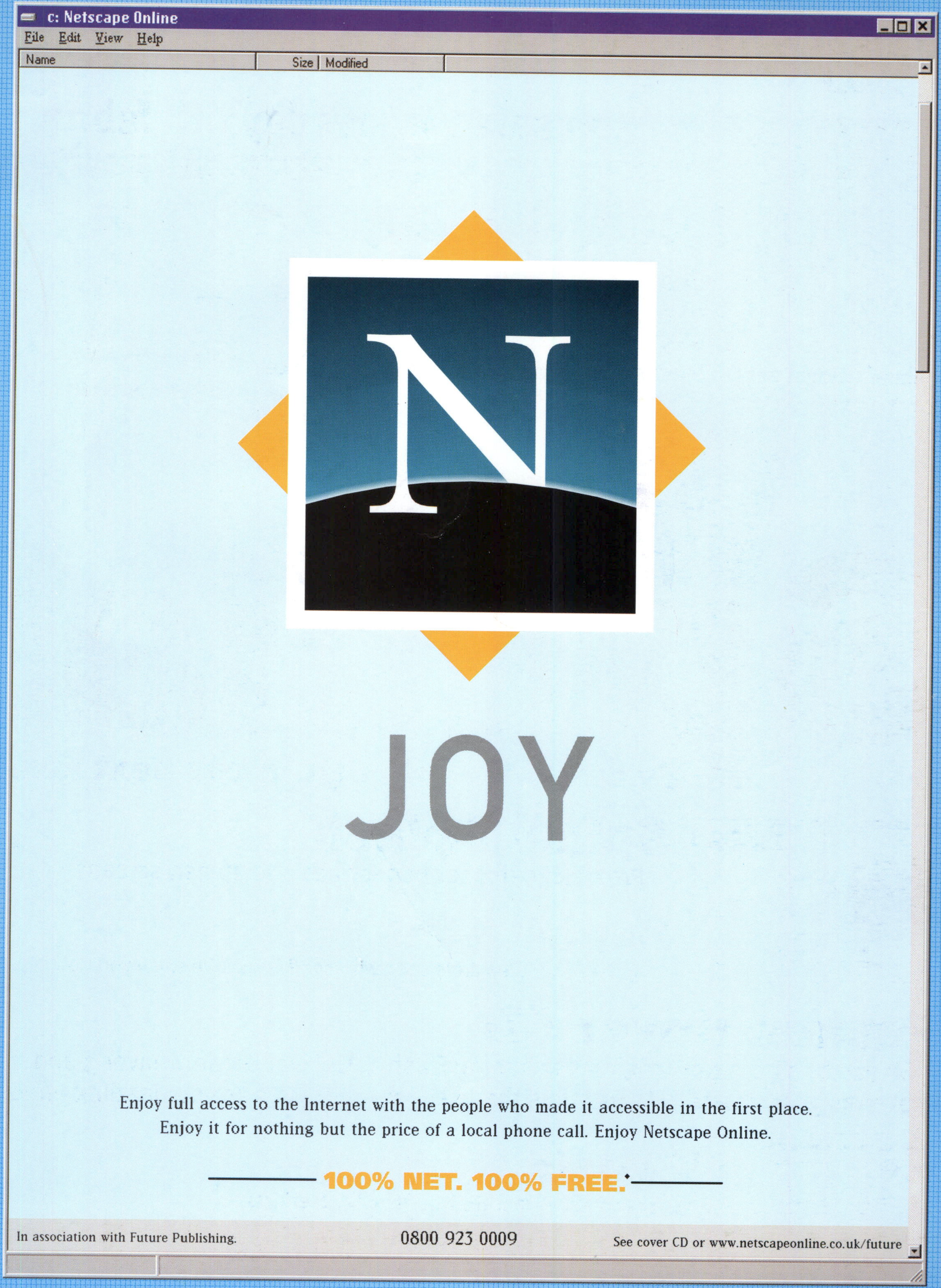

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